

DEPARTMENT OF THE INTERIOR
CANADA

HON. W. J. ROCHE, *Minister.* W. W. COYT, C.M.G., *Deputy Minister.*

PUBLICATIONS
OF THE
Dominion Observatory
OTTAWA

W. F. KING, C.M.G., LL.D., *Director.*

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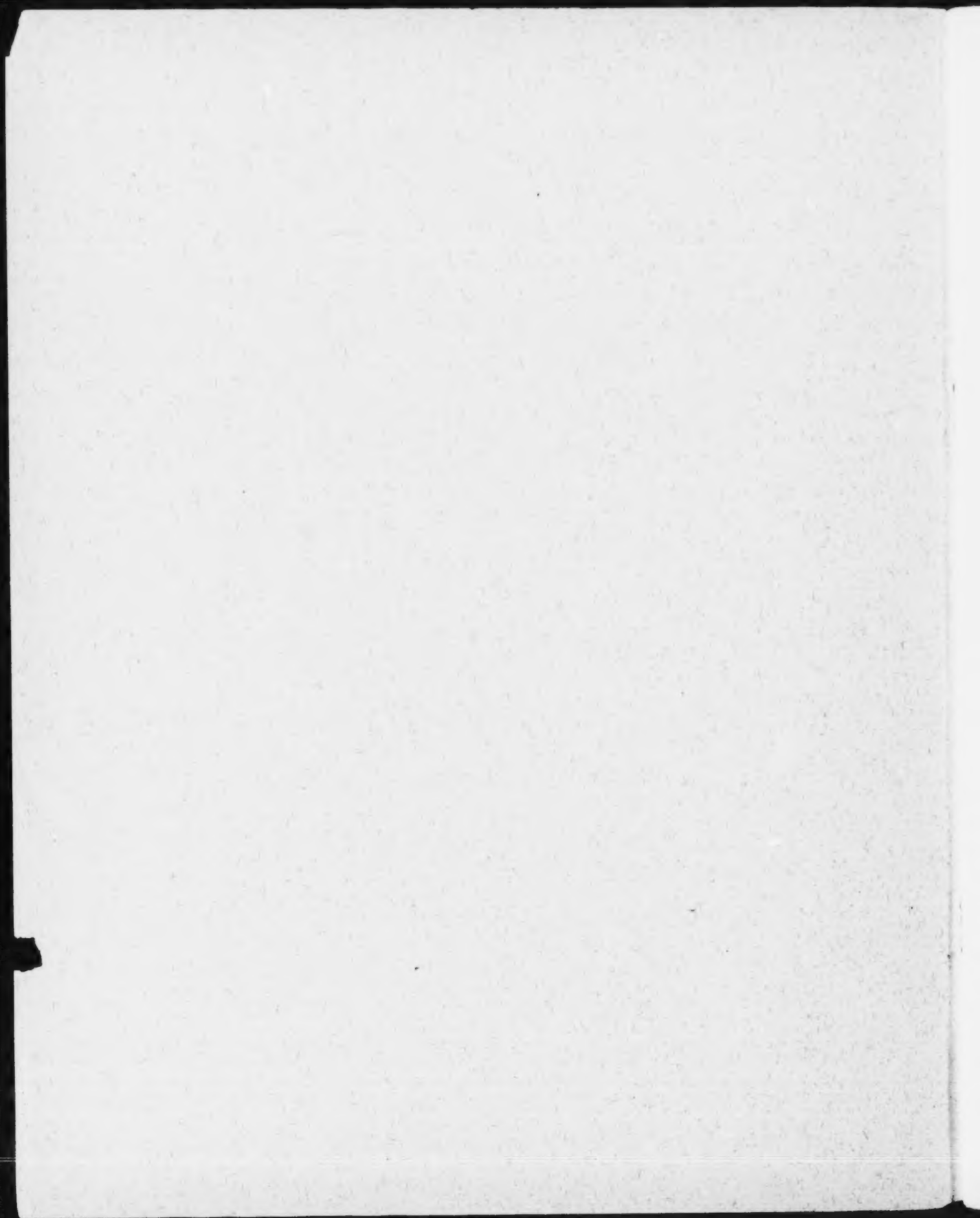
Precise Levelling

BY

F. B. REID, D.L.S.

OTTAWA
GOVERNMENT PRINTING BUREAU
1915

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Supervisor of Levelling.

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PRECISE LEVELLING.

This publication is the fifth one on the subject of precise levelling by the Geodetic Survey of Canada, the ones previously issued being Appendix No. 5 to the Chief Astronomer's report for 1910 and three "Publications of the Dominion Observatory", Vol. I, Nos. 2, 3 and 8. These are all by the writer with the exception of Vol. I, No. 2, which is by D. H. Nelles, D.L.S.; the levelling shown in it is in the Yukon territory—from White Pass to Dawson, etc. The present publication is arranged in the same general form as last year's, with the results of the levelling set forth in three tables. The index and map included herein are complete for all the work previously published, as well as that in the present publication; the index indicates in which publication descriptions and elevations of bench-marks published before this may be found.

Table I indicates the routes followed between terminal points and gives complete descriptions of all bench-marks established along these routes.

Table II shows in the first two columns the numbers of the bench-marks; in the third and fourth columns the approximate distance (in miles) between bench-marks, and from the initial bench-mark of the line; the fifth and sixth columns (headed "Discrepancy") give the difference (in feet) between the forward levelling and the backward levelling for each section between bench-marks and the accumulated difference from the initial bench-mark. The seventh column gives the elevations of the bench-marks shown in the second column; for convenience, these bench-marks are repeated (in the eighth column) in order that the number of any bench-mark and its elevation may be in adjoining columns. In this table are shown also the elevations determined by the Geodetic Survey for certain bench-marks established by other surveys and connected with our levelling.

Table III shows the elevations at railway stations and at crossings of intersecting railways; also on the bridges over rivers and lakes and the more important streams. Rail elevations were in all cases taken on top of the rail, in front of the telegraph office at telegraph stations and opposite the shelter or platform at flag stations.

The results are given for the following lines:—

1. Halifax, N.S., to Yarmouth, N.S.
2. Depot Harbour, Ont., to Renfrew, Ont.
3. Winnipeg, Man., to Kenora, Ont.
4. Saskatoon, Sask., to Wainwright, Alta.
5. Maple Creek, Sask., to Coutts, Alta.
6. Lethbridge, Alta., to Calgary, Alta.

Line 1—run by J. E. Ratz, 1913, and G. F. Dalton, 1914—was started at a bench-mark (a chiselled groove marked with a broad arrow) on No. 3 storehouse in the Naval Yard, Halifax. The elevation of this has been fixed by the Tidal and Current Survey, Department of the Naval Service, as 12.59 feet above mean sea level at Halifax, determined from the hourly ordinates of the tide, day and night, during nine complete years. Our elevations along line 1 are based upon the above mentioned figures and the line is terminated at Yarmouth upon another bench-mark of the same department (a broad arrow cut in the north wall of the post office); the elevation of this has been fixed by the Tidal Survey as 49.74 feet above mean sea level at Yarmouth, determined from the hourly ordinates of the tide, day and night, during one complete year. Our elevation for the above bench-mark—by precise levelling from Halifax—is 49.636, a difference of only 0.10 ft. The elevations along this line published in Table II are instrumental ones—no adjustment has been made to compensate for the small closing error at Yarmouth.

The elevations along line 2 (G. F. Dalton, 1913, and A. J. Rainboth, 1914) are based upon bench-mark No. 418 on the line from Bala to Sudbury,

which was published in 1914. By referring to the map it will be seen that, with the exception of the gap between Ottawa and Renfrew, a circuit of levels has been completed through Depot Harbour, Toronto, Kempton and Ottawa; utilizing the levelling by the Public Works Department to close up the circuit, the error of closure is found to be 0.25 ft., the distance being about 680 miles. Line 3 (N. H. Smith, 1913) was started at bench-mark MCCCCXCVII of the Public Works Department at Winnipeg. Bench-mark MCCCCLXXXIV at Emerson had already been connected with our levels from Stephen, Minn., and the difference of elevation between these two bench-marks, as ascertained by the Public Works Department—namely 19.146 feet—was used to give us a datum for line 3 or, in other words, an elevation of 767.738 was assigned to bench-mark MCCCCXCVII. Line 4 (N. H. Smith, 1914) commences at bench-mark 28-D on the Regina-Prince Albert line. Line 5 (D. McMillan, 1914) is a continuation of the line from Moosejaw to Maple Creek, published in 1914. It is terminated at Coutts upon bench-mark II-12 of the United States Coast and Geodetic Survey, and exhibits a closing error of 0.26 ft., the two lines being referred to the same datum at Stephen, Minn. Line 6 (G. S. Raley, 1914) was started from bench-mark 196-C on the above mentioned line 5.

All elevations given are instrumental and have had no adjustments applied to them, consequently changes may be made in the future; it should be noted, however, that in all cases where circuits have been closed, the closing errors are quite small.

The standard bench-mark adopted consists of a copper bolt, three-quarters of an inch in diameter and four inches long, stamped on the end with the letters "G.S.C.,B.M." (Geodetic Survey of Canada, Bench-mark). The bolt is sunk horizontally in rock or masonry so that only the circular end is visible; the number of the bench-mark is stamped on this end as well as the letters mentioned above, and a horizontal chisel line is cut, upon which the elevation is taken. At certain points concrete bench-mark piers have been built; these project from six inches to one foot above the ground and extend below the frost line; the copper bolt upon which the elevation is taken is placed horizontally as in other cases, and is about nine inches below the top of the pier.

TABLE I.

BENCH-MARKS BETWEEN HALIFAX AND YARMOUTH, NOVA SCOTIA.
VIA HALIFAX AND SOUTHWESTERN RAILWAY

Note.—These descriptions are written with the assumption that the railway runs in a southwesterly direction from Halifax to Shag Harbour, thence northerly to Belleville and thence westerly to Yarmouth.

- 386-B In east face of stone footing of pilaster at southeast corner of Intercolonial station-house, corner of North and Lockman streets, Halifax.
- 387-B In fourth course of stonework below water-table course, in west end of north wall of clock tower of custom-house, Halifax.
- 388-B In north face of seat-stone of northerly gully on east abutment of subway by which main road from Halifax to Truro passes under Halifax and Southwestern railway at Fairview, 3 miles from Halifax.
- 389-B In northwest side of small rock cut on Halifax and Southwestern railway, 450 feet northeast of mile post 6 from Halifax.
- 390-B In exposed rock surface, 8 feet northwest of Halifax and Southwestern railway track and at seventh telegraph pole southwest of mile post 9 from Halifax.
- 391-B In southeast side of small rock cut on Halifax and Southwestern railway, at seventh telegraph pole northeast of mile post 13 from Halifax.
- 392-B In second course of stonework below bridge-seat, in south face of east retaining wall of Halifax and Southwestern railway bridge over East river, $1\frac{1}{2}$ miles northeast of French Village.
- 393-B In first course of stonework above bridge-seat, in northwest end of northeast face of retaining wall behind southwest abutment of plate-girder bridge on Halifax and Southwestern railway, $\frac{1}{2}$ mile southwest of French Village.
- 394-B In concrete bench-mark pier, 25 feet southeast of northwest line of Halifax and Southwestern railway right-of-way, 130 feet northeast of a private crossing and 0.3 mile northeast of St. Margaret station.
- 395-B In first course of stonework above bridge-seat, in northwest end of northeast face of retaining wall behind southwest abutment of Halifax and Southwestern railway bridge over Ingram river, 1 mile northeast of Ingramport.
- 396-B In exposed rock surface in northwest side of shallow cut on Halifax and Southwestern railway, 100 feet southwest of mile post 32 from Halifax.
- 397-B In first course of stonework above bridge-seat, in northwest end of northeast face of retaining wall behind southwest abutment of Halifax and Southwestern railway bridge over Hubbards river, $\frac{1}{2}$ mile northeast of Hubbards.
- 398-B In exposed rock surface, 30 feet northwest of Halifax and Southwestern railway track, 60 feet southwest of a trestle bridge and 400 feet northeast of mile post 34 from Halifax.

- 400-B In top course of stonework, in northwest end of northeast foundation wall of Halifax and Southwestern station-house at East River.
- 400-B In fourth course of stonework below bridge-seat, in northwest end of southwest abutment of plate-girder bridge on Halifax and Southwestern railway, 0.6 mile southwest of East River station.
- 401-B In first course of stonework above bridge-seat, in southeast end of southwest face of retaining wall behind northeast abutment of subway under Halifax and Southwestern railway, 350 feet southwest of Chester station.
- 402-B In first course of stonework above bridge-seat, in southeast end of northeast face of retaining wall behind southwest abutment of Halifax and Southwestern railway bridge over Middle river, 2 miles northeast of Chester Basin.
- 403-B In fourth course of stonework below bridge-seat, in southeast end of southwest abutment of bridge on Halifax and Southwestern railway, $\frac{1}{4}$ mile southwest of Western Shore station and at mile post 61 from Halifax.
- 404-B In first course of stonework above bridge-seat, in northwest end of northeast face of retaining wall behind southwest abutment of Halifax and Southwestern railway bridge over Martin river, 0.6 mile northwest of Martin River station.
- 405-B In southeast face of southwest abutment of stone and timber culvert under Halifax and Southwestern railway, $2\frac{1}{4}$ miles northeast of Mahone Junction and at fourth telegraph pole southwest of mile post 67 from Halifax.
- 406-B In concrete bench-mark pier, 3 feet northwest of southeast line of Halifax and Southwestern railway right-of-way and 340 feet northeast of mile post 71 from Halifax—immediately northeast of Blockhouse station.
- 407-B In southeast end of southwest stone abutment of open culvert under Halifax and Southwestern railway, 1 mile southwest of Matland and at mileage 75.5 from Halifax.
- 408-B In north face of boulder in centre of shallow cut on Halifax and Southwestern railway—10 feet southeast of track—150 feet southwest of a small stone culvert and 1.2 miles northeast of Bridgewater station.
- 409-B In second course of stonework above bridge-seat, in south end of east face of west abutment of highway bridge over Lahave river at Bridgewater.
- 410-B In second course of stonework below brickwork, in north end of front (or east) wall of Bridgewater post office.
- 411-B In fourth course of stonework below bridge-seat, in northwest end of northeast face of southwest abutment of Halifax and Southwestern railway bridge over Lahave river, $1\frac{1}{4}$ miles from Bridgewater station in the direction of Yarmouth.
- 412-B In first course of stonework above bridge-seat, in northwest end of southwest face of retaining wall behind northeast abutment of bridge on Halifax and Southwestern railway, $4\frac{1}{4}$ miles southwest of Bridgewater and at mileage 85.6 from Halifax.
- 413-B In northwest end of northeast stone abutment of open culvert under Halifax and Southwestern railway at mileage 90.6 from Halifax—midway between Conquerall and Italy Cross.
- 414-B In southeast face of large outcrop of rock—35 feet from southwest end of outcrop—12 feet northwest of northwest line of Halifax and Southwestern railway right-of-way, at sixteenth telegraph pole northeast of mile post 97 from Halifax and $2\frac{1}{4}$ miles northeast of County Line station.
- 415-B In fifth course of stonework below bridge-seat, in west face of north wing-wall of Halifax and Southwestern railway bridge over Port Medway river, 1,000 feet northeast of Medway.

- 116-B In concrete bench-mark pier, 5 feet southeast of northwest line of Halifax and Southwestern railway right-of-way, 135 feet southwest of crossing of Liverpool-Bridgewater highway and 1 mile northeast of Brooklyn
- 117-B In second course of stonework below bridge-seat, in west face of north wing-wall of bridge on Halifax and Southwestern railway, $\frac{1}{4}$ mile northeast of Brooklyn
- 118-B In northwest end of southwest face—4 feet 6 inches below bridge-seat—of northeast concrete abutment of Halifax and Southwestern railway bridge over Liverpool river, $\frac{1}{4}$ mile southwest of Liverpool station.
- 119-B In second course of stonework below water-table course, in north end of west wall of Liverpool post office
- 120-B In north end of west concrete foundation wall—18 inches below woodwork— of Liverpool town hall
- 121-B In west face of large flat boulder, 6 feet southeast of northwest line of Halifax and Southwestern railway right-of-way, between fourth and fifth telegraph poles southwest of mile post 119 from Halifax and at northeast end of tangent at Hunt Point station
- 122-B In northwest end of southwest face of northeast stone abutment of open culvert under Halifax and Southwestern railway, 1 mile southwest of Hunt Point station
- 123-B In east face of large mass of rock, 22 feet northwest of northwest line of Halifax and Southwestern railway right-of-way, at thirteenth telegraph pole northeast of mile post 126 from Halifax and $1\frac{1}{2}$ miles southwest of Port Mouton
- 124-B In southeast end of southwest face of northeast stone abutment of open culvert under Halifax and Southwestern railway, $\frac{1}{4}$ mile southwest of Wilkins
- 125-B In south face of large mass of rock lying along southeast line of Halifax and Southwestern railway right-of-way, $1\frac{1}{2}$ miles southwest of Wilkins and between eighth and ninth telegraph poles northeast of mile post 135 from Halifax
- 126-B In southeast end of southwest face of concrete retaining wall behind northeast abutment of Halifax and Southwestern railway bridge over Tom Tigney river, $1\frac{1}{2}$ miles northeast of Sable River station.
- 127-B In east face of south concrete wing-wall—1 foot below bridge-seat—of Halifax and Southwestern railway bridge over Sable river, $\frac{1}{4}$ mile northeast of Sable River station
- 128-B In northwest end of southwest face of northeast stone abutment of open culvert under Halifax and Southwestern railway, $2\frac{1}{2}$ miles northeast of Lockeport and at mileage 144.4 from Halifax.
- 129-B In southeast face of north concrete wing-wall—2 feet above bridge-seat—of Halifax and Southwestern railway bridge over East river, $2\frac{1}{2}$ miles southwest of Lockeport
- 130-B In northwest end of northeast face of concrete retaining wall behind southwest abutment of bridge on Halifax and Southwestern railway, 300 feet northeast of East Jordan.
- 131-B In second course of stone work above bridge-seat, in southeast end of northeast face of retaining wall behind southwest abutment of Halifax and Southwestern railway bridge over Jordan river, $\frac{1}{4}$ mile northeast of Jordan Falls station.
- 132-B In southeast end of northeast face—20 inches below bridge-seat—of southwest concrete abutment of bridge on Halifax and Southwestern railway, $1\frac{1}{2}$ miles southwest of Jordan Falls station.
- 133-B In second course of stonework below woodwork, in front (or west) wall of Shelburne academy, 18 feet from southwest corner

- 153-B In west face of concrete retaining wall behind south abutment of bridge on Halifax and Southwestern railway, $\frac{1}{2}$ mile north of East Pubnico.
- 154-B In first course of stonework below bridge-seat, in southwest face of southwest retaining wall of Halifax and Southwestern railway bridge over Pubnico river, 1,000 feet south of Pubnico.
- 155-B In south end of west face of small square stone culvert under Halifax and Southwestern railway, 1,500 feet north of Lower Argyle.
- 156-B In east end of north face of south concrete abutment of open culvert under Halifax and Southwestern railway, $\frac{1}{2}$ mile north of Central Argyle and 800 feet north of mile post 227 from Halifax.
- 157-B In first course of stonework below bridge-seat, in southeast face of southeast wing-wall of Halifax and Southwestern railway bridge over Argyle river, $\frac{1}{2}$ mile north of Argyle.
- 158-B In east face of north concrete abutment of open culvert under Halifax and Southwestern railway, 2 miles south of Belleville.
- 159-B In northwest face of northeast wing-wall of open culvert under Halifax and Southwestern railway, $\frac{1}{2}$ mile west of Belleville.
- 160-B In second course of stonework above bridge-seat, in northeast face of northeast retaining wall of Halifax and Southwestern railway bridge over Tusket river, $\frac{1}{2}$ mile west of Tusket.
- 161-B In concrete bench-mark pier, 3 feet north of south line of Halifax and Southwestern railway right-of-way, 520 feet east of west fence line of Yarmouth-Barrington highway crossing, and $1\frac{1}{2}$ miles west of Tusket.
- 162-B In second altar-step below top, in northeast face of northeast concrete wing-wall of large open culvert under Halifax and Southwestern railway, 0.4 mile east of Arcadia.
- 163-B In second course of stonework below water-table course, in south end of west wall of Yarmouth post office.
- 164-B In eleventh course of stonework below woodwork, in south end of west wall of Yarmouth court house.
- 165-B In first course of stonework below water-table course, in south wall—9 feet from southeast corner—of Congregational church, Collins street, Yarmouth.

BENCH-MARKS BETWEEN DEPOT HARBOUR AND RENFREW, ONTARIO,
VIA GRAND TRUNK RAILWAY.

- 567 In rear (or westerly) concrete wall of Grand Trunk roundhouse at Depot Harbour. 18 inches below water-table and at foot of pilaster between engine stalls 11 and 12.
- 566 In concrete bench-mark pier, 8 feet south of north line of Grand Trunk railway right-of-way, 12 feet west of a private crossing, $\frac{1}{2}$ mile east of Depot Harbour and at sixth telegraph pole east of mile post 396 from Alburgh Junction.
- 565 In south end of east face of stone and concrete retaining wall behind east abutment of Grand Trunk railway swing-bridge, 400 feet west of Rose Point station. The copper bolt is 4 feet 4 inches below top and 2 feet 10 inches north of south face of retaining wall.
- 564 In south face—6 feet from southwest corner—of most southerly concrete pier of bridge by which Canadian Pacific railway passes over Grand Trunk railway, $2\frac{1}{2}$ miles east of Rose Point.
Note.—Bench-mark No. 418, on the Bolton-Sudbury line of levels, is in the north abutment of this bridge.

541. In south face of exposed rock surface, 40 feet south of Grand Trunk railway track, 20 feet west of mile post 387 from Alburgh Junction. Trace of the Ottawa River, as indicated by a telegraph pole set out point where Grand Trunk railway and Canadian Northern railway diverge from one another.
542. In south side of small rock cut on Grand Trunk railway, at fourth telegraph pole west of mile post 382 from Alburgh Junction.
543. In west end of south face—3 feet below top—of southwest concrete retaining wall of Grand Trunk railway bridge, $\frac{1}{2}$ mile east of Maple Lake station.
544. In south face of exposed rock surface, 40 feet south of north line of Grand Trunk railway right-of-way, $1\frac{1}{4}$ miles east of Edgington and 340 feet west of mile post 374 from Alburgh Junction.
545. In north face—1 foot 6 inches below top—of northwest concrete retaining wall of Grand Trunk railway bridge over Souin river, $\frac{1}{2}$ mile west of Seguin Lake station.
548. In south face of exposed rock surface, 8 feet south of north line of Grand Trunk railway right-of-way, 180 feet east of a whistle post and between fourth and fifth telegraph poles west of mile post 306 from Alburgh Junction.
547. In north side of small rock cut on Grand Trunk railway—70 feet from west end of cut—300 feet east of mile post 302 from Alburgh Junction— $1\frac{1}{2}$ miles east of Bear Lake station.
546. In west concrete foundation wall—28 inches from northwest corner—of Wm. Morrisson's general store at Sprucedale; this is a concrete block building at southeast corner of main road and first cross road east of the station.
545. In north face of exposed rock surface, 37 feet south of Grand Trunk railway track, 880 feet west of a private crossing and between fifth and sixth telegraph poles east of mile post 354 from Alburgh Junction.
544. In north face of concrete benchmark pier, 4 feet south of north line of Grand Trunk railway right-of-way at a private crossing between second and third telegraph poles east of mile post 350 from Alburgh Junction—and $3\frac{1}{2}$ miles west of Scotia Junction.
543. In south side of rock cut on Grand Trunk railway, 680 feet east of east line of a highway crossing and $\frac{1}{2}$ mile east of Scotia Junction.
542. In south end of west concrete foundation wall—3 feet below woodwork—of H. Braithwaite's hardware store at Kearney, opposite the Kearney house.
541. In north side of small rock cut on Grand Trunk railway at mile post 336 from Alburgh Junction.
540. In north side of rock cut on Grand Trunk railway, 1,500 feet east of section-house at east end of passing-track at Ravensworth and 160 feet east of mile post 333 from Alburgh Junction.
539. In south face of exposed rock surface, 25 feet north of Grand Trunk railway track, 280 feet east of a small bridge, diverging at twentieth telegraph pole west of mile post 328 from Alburgh Junction.
538. In south face of exposed rock surface, 20 feet north of Grand Trunk railway track, 1 mile west of Rainy Lake station and 450 feet west of mile post 325 from Alburgh Junction.
537. In east end of north face—3 feet 3 inches below top—of northeast concrete retaining wall of Grand Trunk railway bridge, $\frac{3}{4}$ mile west of Brulé Lake station.
536. In east face of exposed rock surface, 20 feet south of Grand Trunk railway track and 770 feet east of station-house at Brulé Lake.

- 512 In south face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 513 In north face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 514 In third course of stonework below top, in north face of northeast retaining wall of Grand Trunk railway bridge over Madawaska river, 1,200 feet east of Madawaska station
- 515 In north face of large boulder, 20 feet south of Grand Trunk railway track, 800 feet west of station house at Alburgh Junction and between sixth and seventh telegraph poles east of mile post 267 from Alburgh Junction
- 516 In large boulder on road, below top, in north face of northeast retaining wall of Grand Trunk railway bridge over Madawaska river, 1 1/4 miles east of Whitney
- 517 In south face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 518 In south face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 519 In north face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 520 In north face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 521 In north face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction
- 522 In concrete bench mark post, 8 feet above water-table, on Grand Trunk railway right-of-way, 650 feet west of first rock cut west of Madawaska and 300 feet west of sign "Madawaska 1 mile"
- 523 In north concrete wall of Grand Trunk roundhouse at Madawaska, 2 feet above water-table and at foot of first plaster from southeast corner of engine stall number 1
- 524 In second course of stonework below top, in north face of northeast retaining wall of Grand Trunk railway bridge over Madawaska river, 1,200 feet east of Madawaska station
- 525 In north face of large boulder, 30 feet south of Grand Trunk railway track, 3 miles east of Madawaska and 175 feet east of mile post 260 from Alburgh Junction

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- 09. In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 08. In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 07. In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 06. In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 05. In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.

BLANCH MARSH, 111.111, WINN, 111.111, MANITOBA AND KENORA
ONTARIO, CANADA, 111.111, CANADIAN RAILWAY

- 1.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 2.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 3.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 4.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 5.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 6.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
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- 9.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 10.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 11.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 12.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.
- 13.1 In south face of concrete retaining wall, west end of concrete bridge over Canadian Pacific railway, 100 feet east of Kenora.

- 11 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 12 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 13 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 14 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 15 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 16 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
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- 28 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 29 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 30 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.
- 31 F. In south side of long rock cut on Canadian Pacific railway, west of Ingolf.

- 2-11 In north end of west face of concrete retaining wall behind east abutment of Grand Trunk Pacific railway bridge over South Saskatchewan river, $2\frac{1}{4}$ miles west of South Saskatoon station.
- 3-11 In north face of concrete pier supporting pulleys for interlocking plant—at north side of Grand Trunk Pacific railway section-house, at west end of Grandora passing-track and immediately east of a highway crossing.
- 4-11 In concrete bench-mark pier, 5 feet south of north line of Grand Trunk Pacific railway right-of-way, 335 feet east of east line of a highway crossing, $13\frac{1}{4}$ miles west of Hawoods and at fifth telegraph pole east of mile post 18, same highway.
- 5-11 In west concrete foundation wall—4 inches below woodwork and 7 feet from southwest corner—of Grand Trunk Pacific railway section-house, at east end of passing track at Asquith.
- 6-11 In south concrete foundation wall—1 foot below woodwork and 19 feet from southwest corner—of frame house owned by J. B. King, 100 yards north of Juniata station.
- 7-11 In north end of east face of concrete retaining wall behind west abutment—4 feet above bridge-seat—of Grand Trunk Pacific railway bridge over Eaglehill creek, $2\frac{1}{4}$ miles east of Kinley.
- 8-11 In west concrete foundation wall—8 inches below woodwork and 2 feet from southwest corner—of a frame school house, $\frac{1}{4}$ mile northeast of Leney station.
- 9-11 In north concrete foundation wall—6 inches below galvanized iron sheeting and 6 inches from northeast corner—of engine house of Saskatchewan Co-operative Elevator company's elevator (local No. 11), $5\frac{1}{2}$ miles west of Leney.

BENCH-MARKS BETWEEN SASKATOON, SASKATCHEWAN, AND WAINWRIGHT, ALBERTA, VIA GRAND TRUNK PACIFIC RAILWAY

- 1-II In north end of west face of concrete retaining wall behind east abutment of Grand Trunk Pacific railway bridge over South Saskatchewan river, $2\frac{1}{4}$ miles west of South Saskatoon station.
- 2-II In north face of concrete pier supporting pulleys for interlocking plant—at north side of Grand Trunk Pacific railway section-house, at west end of Grandora passing-track and immediately east of a highway crossing.
- 3-II In west concrete foundation wall—7 inches below woodwork and 30 inches from northwest corner—of Grand Trunk Pacific railway section-house, at west end of Grandora passing-track and immediately east of a highway crossing.
- 4-II In concrete bench-mark pier, 5 feet south of north line of Grand Trunk Pacific railway right-of-way, 335 feet east of east line of a highway crossing, $13\frac{1}{4}$ miles west of Hawoods and at fifth telegraph pole east of mile post 18, same highway.
- 5-II In west concrete foundation wall—4 inches below woodwork and 7 feet from southwest corner—of Grand Trunk Pacific railway section-house, at east end of passing track at Asquith.
- 6-II In south concrete foundation wall—1 foot below woodwork and 19 feet from southwest corner—of frame house owned by J. B. King, 100 yards north of Juniata station.
- 7-II In north end of east face of concrete retaining wall behind west abutment—4 feet above bridge-seat—of Grand Trunk Pacific railway bridge over Eaglehill creek, $2\frac{1}{4}$ miles east of Kinley.
- 8-II In west concrete foundation wall—8 inches below woodwork and 2 feet from southwest corner—of a frame school house, $\frac{1}{4}$ mile northeast of Leney station.
- 9-II In north concrete foundation wall—6 inches below galvanized iron sheeting and 6 inches from northeast corner—of engine house of Saskatchewan Co-operative Elevator company's elevator (local No. 11), $5\frac{1}{2}$ miles west of Leney.

- 20 H 1 In west concrete foundation wall, 4 inches below woodwork and 15 inches from northwest corner—of Grand Trunk Pacific railway station building at Birtlesburg.
- 21 H 1 In west concrete foundation wall, 10 inches below woodwork and 25 inches from southeast corner—of Grand Trunk Pacific station house at Chateau.
- 22 H 1 In concrete abutment pier, 7 feet north of north line of Grand Trunk Pacific railway right-of-way, 2,910 feet from bridge over Riksona creek and 110 feet east of mile post 640 from Winnipeg.
- 23 H 1 In concrete completion wall, 5 inches below woodwork and 10 inches from northwest corner—of Grand Trunk Pacific railway station house at east end of Dunn passing-track.
- 24 H 1 In concrete foundation pier, 7 inches below top of concrete abutment along westerly wall of Alberta Co-operative Farm, 100 paces east of road No. 86 at Edgerton.
- 25 H 1 In west concrete foundation wall, 4 inches below woodwork and 8 inches from southwest corner—of Grand Trunk Pacific railway station house at north end of Hurdle point east of station.
- 26 H 1 In concrete foundation pier, 6 feet south of north line of Grand Trunk Pacific railway right-of-way, 1 mile east of Camsbachs and 90 feet west of mile post 661 from Winnipeg.
- 27 H 1 In south concrete foundation wall, 2 inches below woodwork and 18 inches from southwest corner—of Wapiti right-of-way school.

BENCH MARKS BETWEEN MAPLE CREEK, SASKATCHEWAN, AND COUTTS, ALBERTA, VIA CANADIAN PACIFIC RAILWAY

- 146 C In south face of concrete retaining wall behind west abutment, 4 feet above bridge-sill—of plate-girder bridge on Canadian Pacific railway, 0.4 mile west of Maple Creek and at mileage 84.9 from Swift Current.
- 147 C In east end of south face of stone coping on southeast retaining wall of plate-girder bridge on Canadian Pacific railway, 3½ miles west of Maple Creek and at mileage 88.1 from Swift Current.
- 148 C In south face of concrete retaining wall behind west abutment of small plate-girder bridge on Canadian Pacific railway, 5½ miles west of Maple Creek and at mile post 90 from Swift Current.
- 149 C In concrete abutment pier, 5 feet north of south line of Canadian Pacific railway right-of-way, 1¼ miles east of Kincaid and 150 feet west of mile post 96 from Swift Current.
- 150 C In west face of south face wall of concrete arch culvert under Canadian Pacific railway, 1¼ miles east of Hutton.
- 151 C In west concrete completion wall, 10 inches below woodwork and 9 inches from southwest corner—of Hotel Forbes at Hutton, 240 feet north of the station.
- 152 C In south face of vertical supporting wall of double concrete culvert under Canadian Pacific railway, 1 mile east of Cummings and at mileage 108.4 from Swift Current.
- 153 C In south end of west face, 6 inches below top of concrete retaining wall behind west abutment of plate-girder bridge on Canadian Pacific railway, 2½ miles west of Cummings and at mileage 111.9 from Swift Current.
- 154 C In south end of east face, 6 inches below bridge-sill of west concrete abutment of open culvert under Canadian Pacific railway, 2¼ miles east of Walsh and at mileage 112.8 from Swift Current.

- [illegible]

- 174 C In west face of coping on south end of large concrete arch culvert under Canadian Pacific railway, 2·3 miles west of Sevenpersons and 1,000 feet east of mile post 20 from Dunmore
- 175 C In west face of large boulder, 130 feet south of south line of Canadian Pacific railway right-of-way, 400 feet west of a highway crossing and 200 feet east of mile post 27 from Dunmore
- 176 C In west concrete foundation wall—16 inches below woodwork and 6 feet from southwest corner—of Oddfellows Hall at Winnifred—a frame building northwest of the station
- 177 C In concrete bench-mark pier, 4 feet north of south line of Canadian Pacific railway right-of-way, 330 feet east of a farm crossing, 1½ miles west of Winnifred and 380 feet west of mile post 34 from Dunmore
- 178 C In south face wall, immediately above southwest wing-wall of concrete arch culvert under Canadian Pacific railway, ¾ mile east of Bow Island and at mileage 40·3 from Dunmore
- 179 C In north end of west concrete foundation wall—13 inches below woodwork—of Roman Catholic church at Bow Island
- 180 C In north concrete foundation wall—1 foot 9 inches below woodwork and 4 feet 7 inches from northeast corner—of G. H. Johnston's general store and telephone office at Burdett
- 181 C In west concrete foundation wall—8 inches below woodwork and 5 feet 5 inches from southwest corner—of Methodist church at Burdett
- 182 C In west concrete foundation wall—15 inches below brickwork and 7 feet 6 inches from southwest corner—of hardware store of Larsen Bros. and Hinck, at Grassy Lake
- 183 C In east end of north concrete foundation wall—5 feet 6 inches below brickwork—of Grassy Lake public school
- 184 C In concrete bench-mark pier, 4 feet north of south line of Canadian Pacific railway right-of-way, 350 feet east of a highway crossing, 1 mile east of Purple Springs and 87 feet east of mile post 64 from Dunmore
- 185 C In concrete bench-mark pier, 5 feet north of south line of Canadian Pacific railway right-of-way, 4½ miles east of Taber and 100 feet east of mile post 72 from Dunmore
- 186 C In west concrete foundation wall—18 inches below brickwork and 4 feet from southwest corner—of Canadian Bank of Commerce at Taber
- 187 C In west concrete foundation wall—9 inches below brickwork and 4 feet 8 inches from southwest corner—of Taber public school
- 188 C In west end of south face of square concrete culvert under Canadian Pacific railway, 2 miles west of Taber
- 189 C In centre of south face of square concrete culvert under Canadian Pacific railway, 360 feet east of a highway crossing and at mileage 85·7 from Dunmore
- 190 C In south face-wall, immediately above southwest wing-wall of square concrete culvert under Canadian Pacific railway, 600 feet west of westerly switch at Neidpath passing-track and at mileage 86·8 from Dunmore
- 191 C In west concrete foundation wall—15 inches below woodwork and 4 feet 6 inches from southwest corner—of school house at Chin
- 192 C In south face of concrete retaining wall behind west abutment of plate-girder bridge on Canadian Pacific railway, 1 mile west of Chin.

- 193-C In west end of south face of square concrete culvert under Canadian Pacific railway, 700 feet west of mile post 94 from Dunmore.
- 194-C In west end of south face of square concrete culvert under Canadian Pacific railway, 600 feet east of Coal-dale.
- 195-C In south face-wall, immediately above southwest wing-wall, of double concrete culvert under Canadian Pacific railway, $3\frac{1}{4}$ miles east of Lethbridge and 400 feet west of mile post 105 from Dunmore.
- 196-C In second course of stonework below water-table course, in east end of south wall of Canadian Pacific station-house at Lethbridge.
- 197-C In fourth course of stonework below water-table course, in west wall of Lethbridge post office, 17 feet from northwest corner.
Note.—The copper bolt is below the surface of the concrete sidewalk on Seventh street; access to it may be had by a small chamber fitted with an iron cover.
- 198-C In east face of granite plinth course at foot of pilaster at southeast corner of Lethbridge court house.
- 199-C In second course of stonework below water-table course, in east wall—11 feet 6 inches from southeast corner—of Wesley Methodist church, Lethbridge.
- 200-C In north concrete foundation wall—7 inches below woodwork and 12 feet from northeast corner—of stock building "C," at Lethbridge exhibition grounds, immediately west of Canadian Pacific railway—Combs subdivision.
- 201-C In concrete bench-mark pier, 5 feet east of west line of Canadian Pacific railway right-of-way, $\frac{3}{4}$ mile north of Wilson and 67 feet south of mile post 9 from Montana Junction.
- 202-C In north face of boulder, 10 feet east of west line of Canadian Pacific railway right-of-way and at sixteenth telegraph pole south of mile post 12 from Montana Junction.
- 203-C In south end of west concrete foundation wall—1 foot below woodwork—of Canadian Pacific station-house at Stirling.
- 204-C In east concrete foundation wall—8 inches below woodwork and 12 feet from southeast corner—of Stirling Presbyterian church, a small frame building about $\frac{1}{4}$ mile west of the station.
- 205-C In concrete bench-mark pier, 5 feet east of west line of Canadian Pacific railway right-of-way, 2 miles north of New Daxton and 468 feet north of mile post 25 from Montana Junction.
- 206-C In south end of east concrete foundation wall—14 inches below woodwork—of Canadian Bank of Commerce at New Daxton.
- 207-C In east concrete foundation wall—20 inches below woodwork and 11 feet from northeast corner—of New Daxton public school.
- 208-C In concrete bench-mark pier, 4 feet east of west line of Canadian Pacific railway right-of-way, 520 feet north of a bridge over a small brook and 85 feet north of mile post 35 from Montana Junction.
- 209-C In south concrete foundation wall—15 inches below woodwork and 9 feet 7 inches from southeast corner—of First Evangelical church at Warner.
- 210-C In south concrete foundation wall—7 $\frac{1}{2}$ inches below brickwork and 15 feet 6 inches from southwest corner—of Warner public school.
- 211-C In north face of large flat boulder, 200 feet west of west line of Canadian Pacific railway right-of-way, 1,450 feet east of a highway crossing and 1,345 feet north of mile post 43 from Montana Junction.

- 212 C In concrete bench-mark pier, 5 feet east of west line of Canadian Pacific railway right-of-way, 4 miles north of Milk River station and 215 feet north of mile post 51 from Mountain Junction.
- 213 C In south end of east concrete foundation wall—18 inches below water-table—of Canadian Bank of Commerce at Milk River.
- 214 C In east face—8 feet 6 inches below bottom of coping—of northeast concrete retaining wall of highway bridge over Milk river in the village of Milk River.
- 215 C In concrete bench-mark pier, 5 feet east of east line of Canadian Pacific railway right-of-way, 6 miles south of Milk River and 100 feet south of mile post 58 from Mountain Junction.
- 216 C In north face of concrete pier, built originally for astronomical observations, 240 feet west of Canadian Pacific railway track, 1,050 feet north of international boundary and 150 feet south of Centre post office.

BENCH MARKS BETWEEN LETHBRIDGE AND CALGARY, ALBERTA,
VIA CANADIAN PACIFIC RAILWAY THROUGH KIPP,
CARMANGAY AND ALDERSYDE.

Note.—These descriptions are written with the assumption that the railway runs in a northwesterly direction from Kipp to Sandstone and thence northerly to Calgary.

- 83 D In south end of west face of concrete retaining wall behind east abutment of Canadian Pacific railway viaduct over Belly river at Lethbridge— $\frac{1}{4}$ mile west of station.
- 82 D In north end of east face of concrete retaining wall behind west abutment of Canadian Pacific railway viaduct over Belly river at Lethbridge— $\frac{1}{4}$ miles west of station.
- 81 D In east end of north concrete foundation wall—10 inches below woodwork—of Canadian Pacific railway section-house, 500 feet west of Kipp station.
- 80 D In concrete bench-mark pier, 8 feet northeast of southwest line of Canadian Pacific railway right-of-way, 45 feet northwest of a farm crossing and 800 feet southeast of mile post 5 from Kipp.
- 79 D In northeast concrete foundation wall—7 inches below woodwork and 11 feet from north corner—of Canadian Pacific railway section-house, 600 feet northwest of Nobleford station.
- 78 D In concrete bench-mark pier, 7 feet northeast of southwest line of Canadian Pacific railway right-of-way, 820 feet southeast of mile post 12 from Kipp and about 1,900 feet northwest of a highway crossing.
- 77 D In west end of south concrete foundation wall—21 inches below brickwork—of westerly section of public school at Barons.
- 76 D In northeast concrete foundation wall—7 inches below woodwork and 10 feet from north corner—of Canadian Pacific railway section-house, 600 feet northwest of Barons station.
- 75 D In concrete bench-mark pier, 7 feet northeast of southwest line of Canadian Pacific railway right-of-way, 810 feet northwest of a highway crossing, 7 miles southeast of Carmangay and 1,025 feet southeast of mile post 24 from Kipp.
- 74 D In centre of north face of concrete parapet on north side of roadway, at main entrance of Carmangay public school.
- 73 D In south end of north or east corner—foundation wall—9 inches below woodwork—of Canadian Pacific section-house at Carmangay.

- 72-D In concrete bench-mark pier, 6 feet northeast of southwest line of Canadian Pacific railway right-of-way, $1\frac{1}{4}$ miles northwest of Carmangay and 320 feet southeast of mile post 32 from Kipp.
- 71-D In northwest concrete foundation wall—2 feet below brickwork and 5 feet 6 inches from west corner—of public school at Champion.
- 70-D In southwest concrete foundation wall—8 inches below woodwork and 11 feet from south corner—of Canadian Pacific railway section-house at Kirkealdy.
- 69-D In southwest concrete foundation wall—9 inches below woodwork and 4 feet from west corner—of Canadian Bank of Commerce at Vulcan.
- 68-D In southeast end of rear (or southwest) concrete foundation wall—22 inches below woodwork—of Canadian Pacific station-house at Vulcan.
- 67-D In concrete bench-mark pier, 6 feet northeast of southwest line of Canadian Pacific railway right-of-way, 240 feet northwest of a trestle bridge, 255 feet southeast of mile post 54 from Kipp and 5 miles northwest of Vulcan.
- 66-D In northeast concrete foundation wall—8 inches below woodwork and 10 feet from north corner—of Canadian Pacific railway section-house, 740 feet southeast of Ensign station.
- 65-D In southeast end of rear (or southwest) concrete foundation wall—7 inches below woodwork—of Canadian Pacific station-house at Brant.
- 64-D In concrete bench-mark pier, 8 feet northeast of southwest line of Canadian Pacific railway right-of-way, 10 feet northwest of a highway crossing and $2\frac{1}{4}$ miles northwest of Brant.
- 63-D In east end of north concrete foundation wall—15 inches below woodwork—of front (or east) section of public school at Blackie.
- 62-D In concrete bench-mark pier, 7 feet northeast of southwest line of Canadian Pacific railway right-of-way, 145 feet southeast of a highway crossing, 3 miles northwest of Blackie and 527 feet northwest of mile post 75 from Kipp.
- 61-D-2 In northeast concrete foundation wall—4 inches below woodwork and 30 inches from north corner—of Canadian Pacific railway section-house at Mazeppa.
- 61-D In concrete bench-mark pier, 7 feet northeast of southwest line of Canadian Pacific railway right-of-way, 187 feet southeast of southeast end of bridge over Highwood river and $1\frac{1}{2}$ miles southeast of Alderside.
- 60-D In south face of west concrete retaining wall—32 inches above bridge-seat and directly in line with southwesterly truss—of Canadian Pacific railway bridge over Sheep creek, 1 mile southeast of Okotoks.
- 59-D In southwest end of southeast face of concrete retaining wall behind northwest abutment of plate-girder bridge on Canadian Pacific railway, $1\frac{3}{4}$ miles northwest of Okotoks.
- 58-D In north end of west face of square concrete culvert under Canadian Pacific railway, 460 feet south of Sandstone station.
- 57-D In north face of east face-wall of concrete culvert under Canadian Pacific railway, 1 mile north of De Winton.
- 56-D In north face of east face-wall of concrete culvert under Canadian Pacific railway, 2 miles north of De Winton.
- 55-D In west face of exposed rock surface, 6 feet east of east line of Canadian Pacific railway right-of-way, 600 feet south of mile post 10 and $1\frac{1}{4}$ miles south of Midnapore.

- 54-D In southeast face of northeast concrete retaining wall—2 feet above bridge-seat—of Canadian Pacific railway bridge over Fish creek, 0.6 mile north of Midnapore.
- 53-D In south face of west face-wall of concrete culvert under Canadian Pacific railway, $2\frac{3}{4}$ miles north of Midnapore.
- 52-D In west face—26 inches below top— of concrete footing of bridge by which Canadian Pacific railway (Macleod subdivision) passes under Canadian Northern railway, 2 miles southeast of Calgary station. The footing referred to is under a steel upright at south side of bridge and to the east of the Canadian Pacific railway track.
- 51-D In sixth course of stonework below water-table course, in south face of corner stone at southeast corner of Calgary city hall.
- 50-D In second course of stonework below water-table course, in west face of corner stone at northwest corner of Calgary court house.

TABLE II.
RESULTS OF PRECISE LEVELLING
HALIFAX TO YARMOUTH, N.S.

BENCH-MARK.		Distance between bench- marks.	Dis- tance from bench- mark No. B.	DISCREPANCY.		Elev. above mean sea level	BENCH- MARK.
From.	To.			Feet.	Feet.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
						12.590	
						60.743	386-B
386-B	387-B	1.0	1.0	-.013	-.013	21.575	387-B
386-B	388-B	2.9	2.9	-.014	-.014	40.963	388-B
388-B	389-B	3.0	5.9	+.025	+.011	275.732	389-B
389-B	390-B	3.3	9.2	-.017	-.006	240.148	390-B
390-B	391-B	3.6	12.8	-.028	-.034	305.116	391-B
391-B	392-B	5.3	18.1	-.032	-.066	198.912	392-B
392-B	393-B	2.2	20.3	-.011	-.077	79.856	393-B
393-B	394-B	2.5	22.8	+.002	-.075	56.192	394-B
394-B	395-B	4.5	27.3	-.035	-.110	28.259	395-B
395-B	396-B	4.6	31.9	-.015	-.125	70.564	396-B
396-B	397-B	2.3	34.2	-.017	-.142	34.887	397-B
397-B	398-B	4.6	38.8	-.020	-.171	115.522	398-B
398-B	399-B	3.7	42.5	-.024	-.195	56.172	399-B
399-B	400-B	0.6	43.1	+.010	-.185	13.823	400-B
400-B	401-B	7.8	50.9	-.008	-.193	43.505	401-B
401-B	402-B	3.1	54.3	-.018	-.211	39.141	402-B
402-B	403-B	6.1	60.7	-.032	-.243	41.446	403-B
403-B	404-B	2.7	63.1	+.001	-.242	32.542	404-B
404-B	405-B	3.1	66.8	+.023	-.219	86.650	405-B
405-B	406-B	3.8	70.6	-.005	-.224	171.307	406-B
406-B	407-B	1.5	75.1	-.025	-.249	180.655	407-B
407-B	408-B	1.1	79.2	-.022	-.271	97.522	408-B
408-B	409-B	1.2	80.4	-.009	-.280	12.591	409-B
409-B	410-B		80.4	.000	-.280	38.207	410-B
409-B	411-B	1.1	81.8	-.003	-.283	44.491	411-B
411-B	412-B	3.6	85.4	-.026	-.309	206.780	412-B
412-B	413-B	4.9	90.3	-.021	-.330	195.700	413-B
413-B	414-B	5.9	96.2	-.039	-.369	247.339	414-B
414-B	415-B	6.6	102.8	-.041	-.410	6.047	415-B
415-B	416-B	6.1	108.9	-.016	-.426	79.634	416-B

B = reference bench-mark, Department of the Naval Service.

RESULTS OF PRECISE LEVELLING
HALIFAX TO YARMOUTH, N.S.—Continued

BENCH-MARK.		Distance between successive bench- marks.	Distance from bench- mark 386-B	DISCREPANCY		Elev. above mean sea-level	BENCH- MARK.
From	To			Partial.	Total		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
416-B	417-B	0.6	109.5	+ .011	— .415	37.351	417-B
417-B	418-B	2.4	111.9	+ .002	— .413	5.868	418-B
418-B	419-B	1.1	113.0	— .013	— .426	20.064	419-B
419-B	420-B	.....	113.0	+ .000	— .417	23.340	420-B
418-B	421-B	6.5	118.4	+ .014	— .300	77.873	421-B
421-B	422-B	1.5	119.9	+ .004	— .305	33.505	422-B
422-B	423-B	5.0	124.9	+ .025	— .370	167.974	423-B
423-B	424-B	8.0	132.9	+ .008	— .362	197.982	424-B
424-B	425-B	1.1	134.0	+ .006	— .356	170.591	425-B
425-B	426-B	4.5	138.5	+ .021	— .335	70.115	426-B
426-B	427-B	1.0	139.5	+ .001	— .334	5.916	427-B
427-B	428-B	4.1	143.6	— .007	— .341	24.266	428-B
428-B	429-B	5.1	148.7	+ .034	— .307	25.956	429-B
429-B	430-B	5.1	153.8	+ .010	— .297	13.348	430-B
430-B	431-B	2.4	156.2	— .005	— .302	10.826	431-B
431-B	432-B	1.8	158.0	+ .011	— .291	47.511	432-B
432-B	433-B	3.9	161.0	— .019	— .310	60.967	433-B
433-B	434-B	0.2	162.1	+ .004	— .306	60.732	434-B
434-B	435-B	0.2	162.3	— .004	— .310	27.736	435-B
433-B	436-B	1.0	162.9	+ .007	— .303	32.950	436-B
436-B	437-B	0.9	163.8	+ .003	— .300	6.654	437-B
437-B	438-B	4.8	168.6	+ .032	— .268	4.389	438-B
438-B	439-B	6.4	175.0	+ .029	— .239	56.511	439-B
439-B	440-B	4.3	179.3	+ .030	— .209	15.637	440-B
440-B	441-B	5.1	184.7	— .005	— .214	22.044	441-B
441-B	442-B	2.2	186.9	+ .005	— .209	6.151	442-B
442-B	443-B	2.8	189.7	+ .010	— .199	75.036	443-B
443-B	444-B	1.2	193.9	— .003	— .202	8.349	444-B
444-B	445-B	2.2	196.1	+ .004	— .198	18.675	445-B
445-B	446-B	1.5	197.6	+ .017	— .181	21.675	446-B
446-B	447-B	1.2	198.8	+ .001	— .180	7.239	447-B
447-B	448-B	2.4	201.2	— .015	— .195	45.185	448-B
448-B	449-B	1.5	202.7	+ .004	— .191	7.071	449-B
449-B	450-B	1.5	207.2	— .019	— .210	37.004	450-B
450-B	451-B	1.7	208.9	— .006	— .216	43.593	451-B
451-B	452-B	4.5	213.4	— .011	— .227	11.728	452-B
452-B	453-B	3.8	217.2	— .035	— .262	11.296	453-B

RESULTS OF PRECISE LEVELLING
ITALIAN TO YARMOUTH (N.S.)

Between Mean		Difference between		Difference between		Height above mean sea level	Between Mean
From	To	From	To	From	To		
No.	No.	Mean	Mean	Feet	Feet	Feet	No.
151 B	150 B	2.4	9.6	0.17	24.6	96.58	151 B
151 B	152 B	4.4	26.4	0.05	25.0	50.344	152 B
152 B	156 B	5.4	29.8	0.07	24.6	31.522	156 B
156 B	157 B	2.6	27.1	0.01	24.4	8.896	157 B
157 B	158 B	2.9	22.0	0.11	25.6	39.942	158 B
158 B	159 B	2.7	—	0.05	25.0	14.720	159 B
159 B	160 B	2.8	2.7	0.11	2.4	11.608	160 B
160 B	161 B	1.1	268.6	0.04	26.0	22.191	161 B
161 B	162 B	5.7	24.2	0.28	28.8	20.061	162 B
162 B	163 B	5.5	97.8	0.1	34.0	48.212	163 B
163 B	164 B	0.2	248.0	0.01	34.8	61.489	164 B
164 B	165 B	0.5	248.5	0.08	32.6	67.755	165 B

Corrections at Halifax with P. J. de Winter's Benchmarks.

B.M. MXXIV No. 1, bench mark, July 9, 1966.

B.M. MXXVII D. bench mark, August 1, 1933.

B.M. MXXVIII B. bench mark, post 3, July 13, 1961.

For information at Yarmouth, see Table Survey B.M., see Introduction.

RESULTS OF PRECISE LEVELLING
DEPOI HARBOUR TO REXBREW ONT

To and From		Distance between successive bench- marks	Distance from bench- mark 418	Discrepancy		Elevations feet on level	Bench- Mark
From	To			Partial	Total		
No	No	Miles	Miles	Foot	Foot	Foot	No
	418					674.930	418
418	564			003	003	656.719	564
564	565	2.7	2.7	000	003	596.598	565
565	566	2.0	4.7	010	013	605.974	566
566	567	0.9	5.6	002	011	604.436	567
	418					674.930	418
418	564			003	003	656.719	564
564	565	1.4	1.4	010	007	763.915	565
565	562	1.9	3.3	023	016	876.686	562
562	561	4.2	13.2	017	033	772.242	561
561	560	3.8	17.0	020	053	899.547	560
560	559	4.3	21.3	008	045	977.056	559
559	558	3.7	25.0	001	046	1018.746	558
558	557	4.0	29.0	019	065	1050.992	557
557	556	5.6	34.6	014	079	1082.741	556
556	555	3.2	37.2	001	080	1081.733	555
555	554	3.8	41.0	011	091	1133.032	554
554	553	4.3	45.3	001	090	1107.669	553
553	552	5.2	50.5	001	091	1115.299	552
552	551	4.5	55.0	010	081	1285.192	551
551	550	6.1	58.1	013	094	1438.433	550
550	549	4.4	62.5	006	100	1513.130	549
549	548	3.5	66.0	000	100	1445.073	548
548	547	5.4	71.4	042	058	1512.919	547
547	546	3.6	75.0	015	043	1476.156	546
546	545	3.0	78.0	021	064	1433.632	545
545	544	3.4	81.4	034	030	1389.617	544
544	543	0.5	81.9	001	029	1392.434	543
543	542	5.4	87.3	043	044	1473.098	542
542	541	3.9	91.2	035	021	1378.840	541
541	540	2.4	93.6	017	038	1305.768	540
540	539	7.1	100.7	039	077	1288.014	539
539	538	2.0	102.7	027	104	1308.462	538
538	537	1.4	107.1	022	082	1287.267	537
537	536	6.1	113.2	033	049	1243.443	536
536	535 A	1.6	114.8	031	080	1264.648	535 A
535 A	535	2.4	116.9	024	056	1207.397	535
535	534	2.9	119.8	004	080	1130.619	534

RESULTS OF PRECISE LEVELLING
 METEOROLOGICAL TO RENTREW ONE

Bench Marks		Differential Height Feet above mean sea-level	Differential Height Feet above mean sea-level	Differences		Level Feet above mean sea-level	Bench Mark
From	To			From	To		
No.	No.	Meters	Meters	Feet	Feet	Feet	No.
504	505	1.2	121.0	-015	093	1084.772	505
505	502	2.1	126.1	-001	094	1072.196	502
502	501	1.7	127.8	-005	089	1066.342	501
501	500	0.2	128.0	-005	084	1062.970	500
500	529	2.9	130.9	004	088	1065.976	529
529	528	0.2	131.1	009	107	1074.154	528
528	527	1.5	137.6	002	109	1181.295	527
527	526	2.8	139.4	051	140	1175.797	526
526	525	2.8	143.2	019	130	1010.907	525
525	524	1.0	144.8	-007	157	1021.980	524
524	523	1.1	138.9	051	168	962.841	523
523	522	6.1	133.9	-002	136	951.448	522
522	521	1.8	136.8	+016	120	881.562	521
521	520	1.1	161.1	+026	094	664.467	520
520	519	2.3	163.4	-012	082	594.072	519
519	518	0.5	163.9	-002	084	567.497	518
518	517	0.2	167.1	014	098	576.581	517
517	516	0.7	170.8	-025	073	565.927	516
516	515	2.1	173.1	-015	058	582.652	515
515	514	6.5	170.6	007	065	571.743	514
514	513	2.8	182.4	013	078	531.263	513
513	512	5.0	187.4	021	099	496.390	512
512	511	0.9	188.3	-013	086	460.280	511
511	510	1.9	192.2	020	106	439.415	510
510	509	1.0	196.2	006	112	390.979	509
509	508	1.2	199.4	008	120	388.475	508
508	507	1.0	202.4	008	128	417.090	507
507	505	0.6	202.7	005	133	425.628	505
505	506	0.1	202.8	-003	130	419.462	506

Connections with Public Works Dept. levels:

B.M. DCCCLXXI - Bench mark on lot 448, 1082.027

B.M. -CCCCCLXXXIV - C.P.R. station Rentrew Elev. 415.090

B.M. -CCCCCLXXXV - C.P.R. water tank Rentrew Elev. 417.869.

RESULTS OF PRECISE LEVELLING
WINNIPEG MAN. TO KENORA, ONT.

Bench-Marks		Distance between successive bench-marks	Distance from Bench-Mark 1-1	Discrepancy		Elev. above mean sea-level	Bench-Marks
From	To			Local	Total		
No.	No.	Miles	Miles	Feet	Feet	feet	No.
	1-1					764.081	1-1
1-1	2-1	0.5	0.5	+ 005	+ 005	765.586	2-1
2-1	3-1	1.3	1.8	+ 022	+ 017	766.181	3-1
3-1	4-1	1.5	3.3	+ 007	+ 010	761.361	4-1
4-1	5-1	5.8	11.1	+ 016	+ 006	780.771	5-1
5-1	6-1	7.8	18.9	+ 011	+ 050	792.391	6-1
6-1	7-1	6.8	25.7	+ 058	+ 068	811.270	7-1
7-1	8-1	7.9	33.6	+ 035	+ 033	817.154	8-1
8-1	9-1	0.8	41.4	+ 008	+ 025	811.646	9-1
9-1	10-1	5.6	40.0	+ 002	+ 023	878.794	10-1
10-1	11-1	3.8	43.8	+ 031	+ 051	915.601	11-1
11-1	12-1	4.3	49.1	+ 010	+ 011	925.869	12-1
12-1	13-1	4.3	53.4	+ 013	+ 061	903.605	13-1
13-1	14-1	3.0	56.4	+ 002	+ 055	898.019	14-1
14-1	15-1	4.3	60.7	+ 027	+ 060	942.099	15-1
15-1	16-1	3.0	63.7	+ 001	+ 059	964.865	16-1
16-1	17-1	3.9	67.6	+ 019	+ 040	995.920	17-1
17-1	18-1	2.9	70.5	+ 015	+ 055	1011.063	18-1
18-1	19-1	2.6	73.1	+ 008	+ 047	1035.274	19-1
19-1	20-1	3.0	76.1	+ 004	+ 051	1051.124	20-1
20-1	21-1	2.1	78.2	+ 021	+ 072	1080.068	21-1
21-1	22-1	3.8	82.0	+ 019	+ 091	1113.811	22-1
22-1	23-1	4.0	86.0	+ 008	+ 099	1061.634	23-1
23-1	24-1	1.4	89.4	+ 005	+ 094	1047.103	24-1
24-1	25-1	4.3	92.7	+ 013	+ 107	1125.015	25-1
25-1	26-1	3.2	95.9	+ 012	+ 119	1188.615	26-1
26-1	27-1	3.0	98.9	+ 030	+ 149	1223.854	27-1
27-1	28-1	3.1	102.0	+ 021	+ 170	1250.009	28-1
28-1	29-1	1.9	106.9	+ 025	+ 195	1226.408	29-1
29-1	30-1	3.4	110.3	+ 005	+ 190	1182.367	30-1
30-1	31-1	3.5	113.8	+ 021	+ 169	1183.081	31-1
31-1	32-1	3.0	116.8	+ 014	+ 183	1137.755	32-1
32-1	33-1	2.4	119.2	+ 003	+ 186	1118.948	33-1
33-1	34-1	5.4	124.6	+ 010	+ 196	1083.387	34-1
34-1	35-1	2.0	126.6	+ 001	+ 197	1084.013	35-1
35-1	36-1	1.2	127.8	+ 022	+ 175	1093.051	36-1
36-1	37-1	0.2	128.0	+ 002	+ 173	1090.832	37-1
37-1	38-1	0.3	128.3	+ 001	+ 174	1082.500	38-1

RESULTS OF PRECISE LEVELLING
SASKATOON, SASK. TO WAINWRIGHT, ALTA.

BENCH MARKS		Distance between bench marks	Distance from 28 D	Distances		Height above C.P.M.S.	BENCH MARK
From	To			From	To		
N	No.	Meters	Meters	Feet	Feet	Feet	No.
	D					1651.509	28 D
	1 H	1.7	1.7	.008	.008	1620.857	1 H
	2 H	2.7	2.7	.024	.016	1657.142	2 H
	3 H	10.8	10.2	.048	.032	1660.554	3 H
	4 H	5.9	21.1	.025	.057	1642.618	4 H
1 H	5 H	3.2	21.5	.015	.072	1712.611	5 H
4 H	6 H	5.5	29.8	.015	.057	1789.459	6 H
5 H	7 H	2.4	92.2	.047	.074	1751.705	7 H
6 H	8 H	8.9	10.2	.047	.027	1813.973	8 H
7 H	9 H	5.5	45.5	.017	.041	1922.795	9 H
8 H	10 H	6.8	92.5	.004	.040	2046.407	10 H
9 H	11 H	1.0	6.3	.036	.976	2096.242	11 H
10 H	12 H	1.5	59.6	.024	.052	2195.804	12 H
11 H	13 H	1.4	64.0	.007	.030	2091.592	13 H
12 H	14 H	1.4	64.0	.026	.033	2421.095	14 H
13 H	15 H	1.4	68.3	.052	.049	2410.567	15 H
14 H	16 H	7.7	76.0	.003	.016	2153.599	16 H
15 H	17 H	6.3	82.5	.001	.017	2225.193	17 H
16 H	18 H	7.3	89.6	.021	.004	2142.550	18 H
17 H	19 H	7.0	97.2	.012	.046	2163.459	19 H
18 H	20 H	0	102.2	.017	.033	2406.474	20 H
19 H	21 H	8.5	110.7	.012	.045	2076.892	21 H
20 H	22 H	1.2	113.9	.029	.046	2092.363	22 H
21 H	23 H	5.5	117.3	.013	.029	1922.229	23 H
22 H	24 H	10.3	127.7	.015	.014	1958.406	24 H
23 H	25 H	5.8	133.5	.003	.017	1985.492	25 H
24 H	26 H	5.4	136.8	.008	.025	1996.118	26 H
25 H	27 H	8.4	145.2	.006	.031	2067.450	27 H
26 H	28 H	5.0	150.2	.017	.014	2009.657	28 H
27 H	29 H	5.6	155.8	.011	.025	1943.876	29 H
28 H	30 H	7.3	163.1	.005	.030	59.784	30 H
29 H	31 H	6.5	166.4	.004	.034	2041.998	31 H
30 H	32 H	6.4	172.8	.003	.034	2108.791	32 H
31 H	33 H	5.9	175.8	.005	.039	2108.848	33 H
32 H	34 H	4.6	180.4	.012	.027	2185.465	34 H
33 H	35 H	6.6	187.0	.037	.010	2262.669	35 H
34 H	36 H	6.8	193.8	.021	.031	2266.888	36 H
35 H		6.5	200.3				

RESULTS OF PRECISE LEVELLING
MAPLE CREEK, SASK., TO COLLETS, ALTA.

BENCH MARKS		Distance between successive bench marks	Distance from beginning mark 94-C	DISCREPANCY		Elev. above mean level	BENCH- MARK
From	To			Partial	Total		
No.	No.	Miles	Miles	Feet	Feet	Feet.	No.
	146-C		198.8		070	2505.817	146-C
146-C	147-C	1.2	202.0	-001	-069	2506.670	147-C
147-C	148-C	1.9	203.9	-007	-062	2504.642	148-C
148-C	149-C	5.9	209.8	-019	-081	2503.311	149-C
149-C	150-C	5.6	215.4	-001	-077	2478.303	150-C
150-C	151-C	1.7	217.1	-001	-078	2469.640	151-C
151-C	152-C	5.0	222.1	-029	-107	2392.100	152-C
152-C	153-C	1.6	225.7	-017	-124	2420.192	153-C
153-C	154-C	0.9	226.6	-002	-126	2421.246	154-C
154-C	155-C	1.0	229.6	-008	-118	2411.800	155-C
155-C	156-C	2.0	231.6	-004	-122	2432.266	156-C
156-C	157-C	2.5	234.1	-005	-117	2461.658	157-C
157-C	158-C	1.8	236.9	-010	-127	2500.119	158-C
158-C	159-C	1.5	239.4	-023	-150	2503.461	159-C
159-C	160-C	0.2	239.6	-003	-153	2500.827	160-C
160-C	161-C	2.0	241.4	-019	-131	2480.328	161-C
161-C	162-C	0.9	242.3	-001	-135	2466.074	162-C
162-C	163-C	3.0	245.3	-009	-114	2426.056	163-C
163-C	164-C	3.2	248.5	-014	-158	2419.033	164-C
164-C	165-C	5.4	253.9	-003	-155	2413.604	165-C
165-C	166-C	2.4	256.2	-009	-146	2317.593	166-C
166-C	169-C	5.0	261.2	-026	-172	2183.274	169-C
169-C	168-C	0.2	261.4	-001	-168	2184.522	168-C
168-C	167-C	0.2	261.6	-010	-158	2186.099	167-C
167-C	170-C	6.0	259.9	-033	-122	2363.451	170-C
170-C	171-C	1.0	260.9	-013	-109	2388.988	171-C
171-C	172-C	6.9	267.8	-001	-108	2450.271	172-C
172-C	173-C	1.6	269.4	-001	-112	2460.625	173-C
173-C	174-C	4.2	273.6	-014	-126	2518.505	174-C
174-C	175-C	7.1	280.7	-003	-129	2763.200	175-C
175-C	176-C	5.8	286.5	-010	-119	2724.517	176-C
176-C	177-C	1.4	287.9	-004	-123	2688.157	177-C
177-C	178-C	6.3	294.2	-019	-142	2597.864	178-C
178-C	179-C	0.5	294.7	-000	-142	2621.734	179-C
179-C	180-C	7.3	302.0	-019	-161	2574.426	180-C

RESULTS OF PRECISE LEVELLING.
 MAPLE CREEK, SASK., TO COUTTS, ALTA.—(Continued.)

From	To	Distance		Difference		Feet. above mark or below	Bench- Mark
		between marks	between marks	between marks	between marks		
		Miles.	Miles.	Feet.	Feet.	Feet.	No.
180-C	181-C		302.0	+004	+165	2576.419	181-C
180-C	182-C	7.9	309.9	+041	+202	2649.851	182-C
182-C	183-C			005	+197	2658.048	183-C
182-C	184-C	8.0	317.9	+008	+210	2619.290	184-C
184-C	185-C	8.1	326.0	+048	+258	2641.552	185-C
185-C	186-C	4.6	330.6	-011	+247	2668.310	186-C
186-C	187-C	0.5	331.1	000	+247	2658.769	187-C
186-C	188-C	1.9	332.5	000	+247	2677.669	188-C
188-C	189-C	7.1	339.6	+035	+282	2730.286	189-C
189-C	190-C	1.0	340.6	-002	+280	2739.649	190-C
190-C	191-C	3.6	344.2	+023	+303	2780.475	191-C
191-C	192-C	0.8	345.0	-003	+300	2773.720	192-C
192-C	193-C	3.0	348.0	+013	+313	2812.108	193-C
193-C	194-C	3.8	351.8	+004	+317	2825.793	194-C
194-C	195-C	7.1	358.9	-009	+308	2901.190	195-C
195-C	196-C	3.3	362.2	-028	+280	2984.862	196-C
196-C	197-C	0.3	362.5	-010	+270	2976.338	197-C
197-C	198-C		362.5	+001	+271	2978.588	198-C
198-C	199-C	0.3	362.8	-009	+262	2994.353	199-C
199-C	200-C	2.6	364.8	+014	+294	2992.352	200-C
200-C	201-C	8.1	372.9	+053	+347	3046.760	201-C
201-C	202-C	3.4	376.3	+003	+350	3072.232	202-C
202-C	203-C	7.1	381.4	013	+337	3040.671	203-C
203-C	204-C	0.3	381.7	-008	+329	3041.123	204-C
203-C	205-C	7.3	388.7	+015	+352	3187.573	205-C
205-C	206-C	2.1	390.8	+021	+373	3196.207	206-C
206-C	207-C		390.8	-005	+368	3210.503	207-C
206-C	208-C	8.1	398.9	-016	+357	3205.644	208-C
208-C	209-C	5.7	404.6	+017	+374	3319.003	209-C

RESULTS OF PRECISE LEVELLING
 MAPLE CREEK, SASK., TO COUTTS, ALTA.—

BENCH-MARK.		Distance between successive bench- marks	Distance from bench- mark 209-C	DISCREPANCY.		Elev. above mean sea-level	BENCH- MARK
From	To			Partial	Total		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
209-C	210-C	0.3	404.9	-.008	+.366	3328.061	210-C
209-C	211-C	2.2	406.8	-.028	+.346	3359.243	211-C
211-C	212-C	8.3	415.1	+.015	+.361	3467.163	212-C
212-C	213-C	1.0	416.1	+.014	+.375	3437.846	213-C
213-C	214-C	0.3	416.4	+.002	+.377	3409.719	214-C
214-C	215-C	5.8	422.2	-.006	+.371	3425.941	215-C
215-C	216-C	6.6	428.8	+.017	+.388	3491.042	216-C
216-C	†	.....	428.8	-.006	+.382	3466.647	†

B.M. H-12 of the U.S. Coast and Geodetic Survey, in international boundary monument No. 354-B, at Coutts.

Connections with bench-marks of Irrigation Surveys Branch, Dept. of the Interior

- At N.W. corner of Dixon Bro's. store, town of Maple Creek (bench-mark No. 118), Elev. 2507.344
- At N.E. corner, tp. 11, rge. 1, W. 4th mer. (iron post), Elev. 2444.800
- On N.W. $\frac{1}{4}$ sec. 26, tp. 11, rge. 1, W. 4th mer. (iron post), Elev. 2443.733
- On N.W. $\frac{1}{4}$ sec. 31, tp. 11, rge. 2, W. 4th mer. (iron post), Elev. 2500.427
- On S.E. $\frac{1}{4}$ sec. 16, tp. 12, rge. 5, W. 4th mer. (iron post), Elev. 2305.4
- At N.E. corner of old court house, Lethbridge, Elev. 2993.430
- On N.E. $\frac{1}{4}$ sec. 21, tp. 2, rge. 16, W. 4th mer. (iron post on north bank of Milk river), Elev. 3412.420

RESULTS OF PRECISE LEVELLING
LETHBRIDGE TO CALGARY, ALTA.

BENCH-MARK		Distance between successive bench- marks	Distance from bench- mark 196 C	DISCREPANCY		Elev. above mean sea-level	Bench- Mark
From	To			Partial	Total		
No.	No.	Miles.	Miles	Feet	Feet	Feet	No.
	196 C					2984.862	196 C
196 C	83-D	0.8	0.8	+ 011	+ 011	2980.806	83 D
83-D	82-D	1.0	1.8	+ 014	+ 025	3001.708	82 D
82-D	81-D	6.3	8.1	+ 015	+ 038	3058.150	81 D
81-D	80-D	5.3	13.4	+ 037	+ 001	3108.756	80 D
80-D	79-D	5.1	18.5	+ 016	+ 017	3221.527	79 D
79-D	78-D	1.8	20.3	+ 002	+ 019	3203.418	78 D
78-D	76-D	6.4	26.7	018	+ 001	3152.806	76 D
76-D	77-D		26.7	+ 001	+ 003	3157.521	77 D
76-D	75-D	5.7	32.4	012	011	3145.784	75 D
75-D	73-D	3.6	36.0	022	043	3081.951	73 D
73-D	74-D		36.0	+ 005	058	3081.211	74-D
73-D	72-D	4.4	40.4	+ 015	020	3161.474	72 D
72-D	71-D	4.3	44.7	+ 019	001	3148.759	71-D
71-D	70-D	8.3	53.0	017	018	3122.059	70 D
70-D	68-D	5.0	58.0	+ 004	011	3140.767	68 D
68-D	69-D		58.0	+ 003	011	3152.532	69 D
68-D	67-D	5.1	63.1	010	021	3146.298	67 D
67-D	66-D	4.5	67.6	004	-028	3266.004	66 D
66-D	65-D	4.5	72.1	019	017	3268.847	65 D
65-D	64-D	2.3	74.4	005	002	3301.664	64 D
64-D	63-D	6.7	81.1	025	077	3355.118	63 D
63-D	62-D	3.0	84.1	+ 005	072	3350.073	62 D
62-D	61-D-2	3.0	87.1	015	087	3364.071	61 D 2
61 D 2	61-D	5.5	92.6	+ 016	071	3391.775	61 D
61-D	60-D	6.2	98.8	015	086	3429.972	60 D
60-D	59-D	2.8	101.6	018	101	3487.295	59 D
59-D	58-D	2.3	103.9	+ 012	092	3522.166	58 D
58-D	57-D	6.1	110.0	+ 025	067	3601.013	57 D
57-D	56-D	1.1	111.1	+ 006	061	3540.931	56 D

RESULTS OF PRECISE LEVELLING
 LETHBRIDGE TO CALGARY, ALTA.—*continued*

BENCH-MARKS.		Distance between successive bench-marks	Distance from bench-mark 196 C	DISCREPANCY		Elev. above mean sea level	BENCH-MARK
From	To			Partial	Total		
No.	No.	Miles.	Miles.	Feet.	Feet	Feet	No.
56 D	55 D	5.0	116.1	+0.09	.022	3429.964	55 D
55 D	54 D	1.9	118.0	+0.03	.019	3413.626	54 D
54 D	53 D	2.1	120.1	+0.01	.018	3435.760	53 D
53 D	52 D	5.4	125.5	+0.02	-.016	3449.459	52 D
52 D	51 D	2.0	127.5	-.020	.036	3428.199	51 D
51 D	50 D	1.1	128.6	-.003	-.039	3444.837	50 D

Connections at Calgary.

Engineering Surveys Branch, Dept. of the Interior—Bench-mark iron post on left bank of Elbow river 870 feet upstream from Twelfth Avenue bridge, Elev. 3423.851

Topographical Surveys Branch, Dept. of the Interior, B.M. H-3, N.E. corner of city hall, Elev. 3430.649

TABLE III.

RAIL ELEVATIONS HALIFAX TO YARMOUTH, N.S.

Elevations taken at 100 yds.		Feet
Halifax, Victoria Hotel		20.0
" " " " " "		28.0
" " " " " "		282.9
Halifax, W. S. " " " "		227.7
" " " " " "		241.1
" " " " " "		232.4
" " " " " "		239.9
" " " " " "		287.4
" " " " " "		203.5
" " " " " "		79.4
" " " " " "		84.7
" " " " " "		97.4
" " " " " "		77.2
" " " " " "		70.8
" " " " " "		44.4
" " " " " "		37.9
" " " " " "		40.8
" " " " " "		68.4
" " " " " "		56.4
" " " " " "		44.4
" " " " " "		91.3
" " " " " "		46.4
" " " " " "		64.8
" " " " " "		43.4
" " " " " "		75.8
" " " " " "		54.2
" " " " " "		56.5
" " " " " "		84.9
" " " " " "		181.6
" " " " " "		206.7
" " " " " "		40.9
" " " " " "		206.0
" " " " " "		201.4
" " " " " "		120.0
" " " " " "		19.4
" " " " " "		21.6
" " " " " "		30.4
" " " " " "		10.4
" " " " " "		73.0
" " " " " "		59.9
" " " " " "		236.6
" " " " " "		215.3
" " " " " "		405.4
" " " " " "		71.4
" " " " " "		45.3
" " " " " "		19.6
" " " " " "		30.3

RAIL ELEVATIONS, HALIFAX TO YARMOUTH, N.S. *Continued*

Elevations taken in 1914.		FEET
Halifax & St. John's R.V.	Fort Joseph	15.5
"	Lower Fort	16.0
"	Street, Garage 158 ft from Highway, water, Oct. 11, 1914, 11.1; rail	15.1
"	Shelburne	71.4
"	Bucktown	11.5
"	Centring Cove	10.6
"	Rose Cove	37.4
"	Road, Bay Road, water, Oct. 21, 1914, 11.4; rail	22.2
"	Greenwood	25.2
"	Port Saxon	25.9
"	Port Clyde	21.7
"	Warrington	10.9
"	Warrington Passage	10.3
"	Argyle Brook	21.1
"	St. George's Harbour	57.8
"	Woods Harbour	38.0
Elevations taken in 1914		FEET
"	Upper Woods Harbour	14.0
"	Lower Fort Pulmon	14.5
"	D'Entremont	20.7
"	East Pulmon	15.9
"	Pulmon	12.2
"	Lower Argyle	69.7
"	Central Argyle	42.4
"	Argyle	42.2
"	Belleville	54.9
"	Tusket	34.9
"	Pleasant Lake	15.1
"	Ardenia	27.6
"	Yarmouth	19.7

RAIL ELEVATIONS, DEPOT HARBOUR TO RENFREW, ONTARIO.

Elevations taken in 1914.		FEET
Grand Trunk Railway	Lake Huron, water, Aug. 25, 1914.	579.4
	Rose Point	600.2
	Boyne river, 1.5 miles east of Rose Point, water, Aug. 22, 1914, 617.3; rail	630.5
	Boyne river, 1.4 miles east of Rose Point, water, Aug. 22, 1914, 625.8; rail	634.5
	Boyne river, 2.5 miles east of Rose Point, water, Aug. 22, 1914, 628.8; rail	652.4
	James Bay Junction	686.3
	Otter Lake station	736.9
	Betty	901.2
	Maple Lake station	797.0
	Edlington	891.3
	Saginaw river, 0.5 mile west of Saginaw Falls, water, Aug. 7, 1914, 936.2; rail	979.7
	Saginaw Falls	962.8
	Saginaw river, 1.8 miles east of Saginaw Falls, water, Aug. 7, 1914, 969.5; rail	978.3
	Saginaw river, 2 miles east of Saginaw Falls, water, Aug. 7, 1914, 969.5; rail	980.6
	Bear Lake station	1038.3
"	Whitford	1097.7
	Springdale	1074.5
	Scott Junction - diamond crossing	1081.3

RAIL ELEVATIONS, DELOE HARBOUR TO RENNELL, ONTARIO

Elevations taken in 1911		1911
Great Northern Railway	DeLoe Harbour	1700.8
	..... June 19, 1911, 1701.1 - 1	1292.9
	.....	1311.7
	.....	1332.2
	.....	1346.6
	Stony Creek, 1 1/2 miles west of DeLoe Harbour, June 2, 1911, 17.7 - 1	1305.0
	Stony Creek, 2 1/2 miles west of DeLoe Harbour, June 2, 1911, 17.7 - 1	1450.7
	Black Lake station	1352.1
	Concession station	1355.6
	La Plante station	1381.1
	..... June 15, 1911	
	Madison, 1 1/2 miles west of Madoc, P.E.I., water, June 21, 1911, 1961.1	1476.7
	.....	1418.9
	Agassiz, P.E.I.	
	Madoc, 1 1/2 miles east of Agassiz, P.E.I., water, June 23, 1911, 1966.1	1416.8
	Madoc, 1 1/2 miles east of Agassiz, P.E.I., water, June 23, 1911, 1966.8	1386.0
	Madoc, 1 1/2 miles east of Agassiz, P.E.I., water, June 23, 1911, 1966.9	1309.5
.....	.....	1292.1
	Rocky Lake station	1268.7
	Whitby	1093.6
	Essex Lake	1035.0
	Madoc	1125.9
	Quebec City	1157.2
	Agassiz station	

Elevations taken in 1913

		1913
	Berry's Bay	982.4
"	Water	955.2
"	Reynolds brook, immediately west of Killaloe, water, Sept. 16, 1913, 585.6 - rail	596.1
"	Killaloe	593.8
"	.....	553.0
"	Georgetown, water, Sept. 19, 1913	589.3
"	Georgetown station	579.5
"	Hard brook, 0.5 mile west of Georgetown, water, Sept. 2, 1913, 549.7 - rail	569.6
"	Georgetown	494.7
"	Carleton	436.7
"	Dundas	442.2
"	Amstutz	402.6
"	Canadian Pacific railway, Kingston-Rennell line, named crossing	420.9
"	Rennell	416.0
Canadian Pacific Railway - Rennell		

RAIL ELEVATIONS, WINNIPEG, MANITOBA TO KENORA, ONTARIO

Elevations taken in 1913		1913
Canadian Pacific Railway	Winnipeg	766.5
	North Fork station	769.1
	.....	772.7
	Concession, Northern railway, diamond crossing	811.7
	Georgetown	795.3
"	Concession, 2 1/2 miles west of Hinchinburg, water, June 12, 1913, 787.5 - rail	

RAIL ELEVATIONS, WINNIPEG, MANITOBA, TO KENORA, ONTARIO, CAN.

Elevations taken in 1911		FEET
Canadian Pacific Ry.	Canadian Northern railway bridge over river, June 12, 1911, 782.2 ft.	782.2
"	Humboldt	796.0
"	Carleton Place	827.0
"	Port Arthur	825.0
"	Port Arthur	881.4
"	Manitowish	962.4
"	Port Arthur	929.6
"	St. Marys	941.2
"	Winnipeg	901.9
"	Winnipeg, river, water, June 20, 1911, 879.6 ft.	879.6
"	Dundas	1005.1
"	Canadian Pacific railway bridge over river, June 12, 1911, 1002.7 ft. C.P.R. rail	1002.7
"	Rosario	1058.2
"	Port Arthur	1112.6
"	Port Arthur	1161.3
"	Interpretation of bridge, Manitoba, Ontario	1150.8
"	Port Arthur	1249.5
"	Port Arthur	1187.0
"	Port Arthur	1060.8
"	Port Arthur, water, July 16, 1911	1085.7
"	Kennedy	1088.2
"	Winnipeg, river, water, June 16, 1911, 1060.1 ft.	1060.1
"	Winnipeg, river, water, June 16, 1911, 1060.8 ft.	1060.8
"	Winnipeg, river, water, June 16, 1911, 1060.8 ft.	1061.0

RAIL ELEVATIONS, SASKATOON, SASKATCHEWAN, TO WAINWRIGHT, ALBERTA

Elevations taken in 1911		FEET
Grand Trunk Pacific Ry.	Canadian Northern railway, Regina-Prince Albert line, far end crossing	1652.9
"	South Saskatchewan river, water, May 11, 1911, 1553 ft.	1624.7
"	Canadian Northern railway, Saskatoon-Calgary line, diamond crossing	1654.4
"	Larley	1658.4
"	Larley	1660.3
"	Granville	1645.1
"	Hawthorn	1710.8
"	Asquith	1791.1
"	Juniper	1758.3
"	Highlyll creek, water, May 27, 1911, 1734.9 ft.	1754.9
"	Larley	1823.4
"	Larley	1986.6
"	Mead	2044.3
"	Neola	2154.0
"	Binger	2125.0
"	Olson	2107.4
"	Palo	2133.5
"	Lands	2225.1
"	Coblenz	2144.3
"	Reford	2143.2
"	Canadian Pacific railway, diamond crossing	2163.6
"	Starr	2106.0
"	Teko	2092.9
"	Unity	2046.4
"	Canadian Pacific railway, overhead crossing, rail 2075.1; G.T.P. Ry. rail	2075.1

RAIL ELEVATIONS SASKATOON, SASKATCHEWAN, TO WAINWRIGHT,
ALBERTA

Elevations taken in 1914

		1914
Canadian Pacific Railway	At Saskatoon	1950.2
	At Yorkton	1984.9
	At Regina	2000.7
	At Moose Jaw	2008.0
	At Swift Current	1997.0
	At Humboldt	2047.8
	At Lloydminster	2059.8
	At Battleford	2052
	At Regina	2028.0
	At Yorkton	2000.0
	At Saskatoon	2000.0
	At Regina	2110.1
	At Yorkton	2172.0
Canadian Northern Railway	At Regina	2175.7
	At Yorkton	2222.4

RAIL ELEVATIONS MAPLE CREEK, SASKATCHEWAN, TO MEDICINE HAT, ALBERTA

Elevations taken in 1914

		1914
Canadian Pacific Railway	At Medicine Hat	2407.0
	At Calgary	2450.1
	At Lethbridge	2477.3
	At Regina	2400.2
	At Yorkton	2446.5
	At Saskatoon	2442.6
	At Regina	2504.7
	At Yorkton	2467.2
	At Saskatoon	2445.8
	At Regina	2411.0
Canadian Northern Railway	At Regina	2419.6
	At Yorkton	2484.2

RAIL ELEVATIONS DUNMORE TO COUTTS, ALBERTA

Elevations taken in 1914

		1914
Canadian Pacific Railway	At Dunmore	2411.0
	At Calgary	2497.5
	At Lethbridge	2441.8
	At Regina	2462.2
	At Yorkton	2480.0
	At Saskatoon	2501.4
	At Regina	2747.8
	At Yorkton	2725.7
	At Saskatoon	2621.4
	At Regina	2576.0
Canadian Northern Railway	At Regina	2652.9
	At Yorkton	2626.4

RAIL ELEVATIONS, DE SMITH TO EQUEST, ALBERTA

Elevations in feet 1911		Feet
Canadian Pacific	De Smith	2671.0
"	Edmonton	2733.2
"	Calgary	2781.9
"	Okotoks	2828.1
"	Calgary	3015.5
"	Medicine Hat	2985.5
"	Edmonton	3005.1

"	Wainwright	3041.6
"	Saskatoon	3126.4
"	Weyburn	3183.7
"	Nor. Division	3215.2
"	Wainwright	3246.2
"	Medicine Hat	3301.5
"	Medicine Hat, Aug. 27, 1911	3368.1
"	Calgary	

RAIL ELEVATIONS, EDMONTON TO CALGARY, ALBERTA

Elevations in feet 1911		Feet
Canadian Pacific	Edmonton	2985.5
"	"	3056.9
"	"	3059.5
"	Okotoks	3225.7
"	Nor. Division	3152.8
"	Edmonton	3082.2
"	Calgary	3071.1
"	Little Bow river, water July 22, 1911, 2962.0, rail	3152.0
"	Chaparral	3324.5
"	Edmonton	3442.0
"	Edmonton	3261.6
"	Edmonton	3269.1
"	Edmonton	3360.8
"	Edmonton	3360.3
"	Medicine Hat	3391.9
"	Highwood river, water June 16, 1911, 3361.7, rail	3415.8
"	Medicine Hat	3435.7
"	Shoeprock, water June 13, 1911, 3416.2, rail	3447.8
"	Okotoks	3530.1
"	Sandstone	3631.6
"	DeWinton	3495.9
"	Acadia	3432.8
"	Midnapore	3448.3
"	Edmonton, Aug. 26, 1911, 3395.1, rail	3443.7
"	Tanner	3420.8
"	Canadian Northern railway, overhead crossing, rail 3447.9, C.P.R. rail	3425.0
"	Elbow river, water May 22, 1911, 3406.2, rail	3439.4
"	Calgary	

INDEX.

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AND NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED.

Note.—Under "Year of Publication."

1910 refers to Appendix No. 5 to the Chief Astronomer's Report for 1910

1913* refers to Vol. I, No. 2, on Precise Levelling

1913 refers to Vol. I, No. 3, on Precise Levelling

1914 refers to Vol. I, No. 8, on Precise Levelling

1915 refers to the present publication.

Place	B.M. Number	Year of Publication	Description	
			Page	Page
A				
Albion, Ont.	54	1910	154	161
Albionville, Que.	59	1910	152	165
Alma, Ont.	64	1914	220	235
Alma, Ont.	57 C	1913	69	85
Alma, Ont.	172	1914	218	234
Alma, Que.	292	1913	60	85
Alma, Ont.	582, 583	1913	61	86
Alma, Ont.	40 B	1910	118	161
Amherst, N.B.	172 B, 173 B	1913	47	74
Amherst, N.S.	115 B	1913	44	73
Amherst, N.B.	240	1913	56	84
Amherst, Ont.	100	1910	157	166
Ample Hill, Ont.	157 B	1915	15	30
Ample, N.S.	41 B	1910	148	161
Ardenburg, Ont. N.B.	28 H	1915	20	34
Ardenburg, Ont.	5 H	1915	49	74
Ardenburg, Ont.	100	1914	60	85
Ardenburg, Ont.	167 B	1914	47	74
Ardenburg, N.S.	104	1910	157	166
Ardenburg, Ont.	28 A, 2, 29	1913	48	75
Ardenburg, Ont.	14 D	1915	72	90
Ardenburg, Ont.	157	1914	225	238
B				
Bala, Ont.	108	1914	66	86
Bala, Ont.	76 D, 77 D	1915	25	38
Barrington, N.S.	141 B	1915	12	29

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH MARKS
HAVE BEEN ESTABLISHED.

Place	B.M. Number	Year of Publication	Description	Elevations	
				Page	Page
Barrington Place, N.S.	446-B	1915		42	29
Bass, Ont.	524	1915		46	52
Bass, N.B.	45-B	1910		448	461
Bassville, N.S.	157-B	1913		48	75
Bassville, Ont.	204	1913		63	85
Bassville, Mass.	46-B	1911		226	250
Bath, Que.	66	1910		133	164
Bath, Ont.	79	1913		61	86
Bathurst, Ont.	346	1913		61	86
Bathurst, Ont.	252	1915		57	81
Bathurst, Ont.	459-B	1915		43	30
Bathurst, N.S.	156, 157	1910		459	467
Bathurst, Ont.	52-B	1915		23	23
Bathurst, Y.T.	18-B	1910		147	160
Bathurst, N.B.	9-D	1913		71	90
Bathurst, Sask.	61-C	1913		69	88
Bathurst, Sask.	12-B	1915		20	34
Bathurst, Sask.	63-D	1915		26	38
Bathurst, Alta.	19-D	1914		227	240
Bathurst, Sask.	111-B	1913		34	73
Bathurst, N.B.	413	1913		61	84
Bathurst, Ont.	317	1913		61	84
Bathurst, Ont.	106-C	1914		229	241
Bathurst, Sask.	31-C, 32-C	1913		67	87
Bathurst, Minn.	260	1913		58	82, 86
Bathurst, Ont.	243	1913		57	81
Bathurst, Ont.	128-B	1913		45	73
Bathurst, N.B.	178-C, 179-C	1915		25	35
Bathurst, Alta.	177	1913		54	79
Bathurst, Ont.	57	1913*		27	27
Bathurst, Y.T.	65-D	1915		26	38
Bathurst, Alta.	219, 220	1913		55	80
Bathurst, Ont.	215-A	1913		64	85
Bathurst, Ont.	409-B, 410-B,				
Bathurst, N.S.	411-B	1915		40	28
Bathurst, N.S.	170-B	1913		47	74
Bathurst, Ont.	60	1910		452	463
Bathurst, Ont.	163	1910		460	467
Bathurst, N.B.	34-B	1910		448	461
Bathurst, Ont.	123	1910		458	466
Bathurst, Ont.	50	1910		454	465
Bathurst, Que.	329	1913		62	84
Bathurst, Ont.	6-B	1910		446	460
Bathurst, Ont.	312	1913		61	83
Bathurst, Ont.	180-C, 181-C	1915		23	35, 36
Bathurst, Alta.	196	1913		55	80
Bathurst, Ont.	13-A 2	1913		49	75
Bathurst, Que.					

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED. (Continued)

Place	B.M. Number	Year of Publication	Description	Elevation
			Page	Page
C				
Cadams, Maine	1 B	1910	146	160
Caddwell, Ont.	512	1915	16	32
Calgary, Alta.	50 D, 51 D, 52 D	1915	27	39
Caledon, Ont.	265	1913	58	82
Canterbury, N.B.	16 B	1910	147	160
Capetown, Que.	26	1913	48	75
Cariboo, Y.T.	48 R	1913*	24	21
Carmichael, Sask.	49 C	1913	68	88
Carmichael, Sask.	74 D, 74 D	1915	25	38
Carmichael, Alta.	50 C	1913	68	88
Carrville, Sask.	108 C	1914	229	241
Caton, Sask.	20 C	1913	67	87
Cartwright, Man.	167	1914	218	234
Cascades, Que.	12 D	1913	72	90
Chamberlain, Sask.	71 D	1915	26	38
Champion, Alta.	113 C	1914	229	241
Chaplin, Sask.	246-A, 247, 247-A	1913	57	81
Chatham, Ont.	373	1914	222	236
" "	283	1913	59	82
Chatsworth, Ont.	30 H	1915	21	34
Chauvin, Alta.	164	1914	218	234
Chelsea, Que.	295, 296	1913	60	83
Chesley, Ont.	401 B	1915	10	28
Chester, N.S.	107	1910	457	466
Chesterville, Ont.	191 C	1915	23	36
Chin, Alta.	352-B	1914	216	233
Chipman, N.B.	192	1913	55	80
Clarkson, Ont.	320, 321	1913	62	83
Clinton, Ont.	14, 15, 16	1910	155	165
Coaticook, Que.	17 H	1915	20	34
Coblenz, Sask.	171	1913	53	79
Cobourg, Ont.	166	1910	460	467
Colborne, Ont.	399 A	1913	65	86
Coldwater, Ont.	144	1910	459	467
Collins Bay, Ont.	10	1910	155	165
Compton, Que.	5 D	1913	71	90
Condie, Sask.	139 B	1913	46	74
Conna Mills, N.S.	10 A, 3, 11 A	1913	49	76
Cookshire, Que.	246 A	1913	55	80
Copetown, Ont.	273	1913	59	82
Corbett, Ont.	489, 490, 491	1914	219	235
Cornwall, Ont.	364	1914	221	236
Cornwall, Ont.	90	1910	456	466
Cornwall, Que.				

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED *Continued*

Place.	B.M. Number.	Year of Publication	Description	Elevation
			Page.	Page
Courtright, Ont.....	363	1914	222	236
Coutts, Alta.....	216 C +	1915	25	37
Craighurst, Ont.....	392	1913	65	86
Craik, Sask.....	16-D	1913	72	90
Crysler, Ont.....	496	1914	220	235
Crystal City, Man.....	16 C	1913	67	87
D.				
Dalhousie Mills, Ont.....	95	1910	456	466
Dauntless, Alta.....	171-C	1915	22	35
Dawson, Sask.....	18-D	1914	227	240
Dawson, Y.T.....	223, 224	1913*	34	34
Debec Jct., N.B.....	20-B	1910	447	460
Deloraine, Man.....	36 C	1913	68	88
Denfield, Ont.....	338	1913	62	84
Denmark, N.S.....	149-B	1913	46	74
Depot Harbour, Ont.....	566, 567	1915	13	31
Deylin, Ont.....	27-E	1914	226	239
Disley, Sask.....	8-D	1913	71	90
Dobbinton, Ont.....	294	1913	60	83
Dresden, Ont.....	370	1914	222	236
Drinkwater, Sask.....	91-C	1913	70	89
Drummondville Jct., Que.....	51	1910	454	464
Duck Lake, Sask.....	42-D	1914	228	240
Dundalk, Ont.....	274	1913	59	82
Dundas, Ont.....	215	1913	55	80
Dundurn, Sask.....	25-D	1914	227	240
Dunmore, Alta.....	165 C	1915	22	35
E.				
Eady, Ont.....	398	1913	65	86
Eastman Jct., Que.....	41	1910	452	463
East Pubnico, N.S.....	453-B	1915	13	29
Eastwood, Ont.....	225	1913	55	80
Edgerton, Alta.....	33-H	1915	21	34
Edmundston, N.B.....	58-B, 59-B, 60-B	1910	449	461
Eganville, Ont.....	514	1915	16	32
Elmwood, Ont.....	297	1913	60	83
Elva, Man.....	44 C	1913	68	88
Embrun, Ont.....	498	1914	220	235
Emerson, Man.....	3 C	1913	66	87

+Also B. M. in International Boundary Monument.

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED *Continued*

Place	B.M. Number	Year of Publication	Description	Elevation
			Page	Page
Elmo, Ont.	241 E, 24 E	1914	226	239
Ensign, Alta	66 D	1915	26	38
Ernestown, Ont.	146	1910	459	467
Erriford, Sask.	115 C	1914	229	241
Estevan, Sask.	62 C, 63 C	1913	69	88
Fairfax, Y.T.	187	1913*	33	33
Exeter, Ont.	332, 333	1913	62	84
	I			
Fairville, N.B.	96 B	1910	451	462
Farnham, Que.	62	1910	452	464
" "	63, 64	1910	453	464
" "	105	1910	457	465
Finch, Ont.	195	1914	219	235
" "	11 D	1913	72	90
Findlater, Sask.	277	1913	59	82
Flesherton, Ont.	351	1914	221	236
Forest, Ont.	215 A	1913	64	85
Fort Erie, Ont.	29 E, 30 E	1914	226	239
Fort Frances, Ont.	47	1910	152	463
Foster, Que.	293 B	1915	9	28
French Village, N.S.	58 C	1913	69	88
Frobisher, Sask.	56	1910	152	463
Fulford, Que.				
	G			
Gainshorough, Sask.	47 C	1913	68	88
Girvin, Sask.	17 D	1913	72	90
Glacier, Y.T.	266	1913*	36	36
Glencoe, Ont.	241, 241 A	1915	56	81
Glen Ewen, Sask.	52 C	1913	68	88
Goderich, Ont.	325, 326, 327	1913	62	83, 84
Goodlands, Man.	38 C	1913	68	88
Gracefield, Que.	481	1914	219	234
Gracetown, Minn.	41 E	1914	26	239
Grafton, Ont.	168	1913	53	79
Grand Coulee, Sask.	101 C	1913	71	89
Grand Falls, N.B.	46 B	1910	448	461
Grand Lague, Que.	78	1910	456	463
Grandora, Sask.	4 H	1915	49	34
Grassy Lake, Alta.	182 C, 183 C	1915	23	36
Green River, N.B.	54 B	1910	449	461
Green Valley, Ont.	97	1910	456	466
Gretna, Man.	4 C	1913	66	87
Grimsby, Ont.	203	1913	63	85
Gull Lake, Sask.	136 C	1914	230	241

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED.—*Continued*

Place	B.M. Number	Year of Publication	Description	Elevation.
			Page	Page
	H.			
Hague, Sask	38 D	1914	228	240
Halbrite, Sask	73-C	1913	69	89
Halifax, N.S.	386 B, 387 B	1915	9	28
Hallock, Minn	2 C	1913	66	87
Hamilton, Ont	198, 199, 200	1913	63	85
Hampton, N.B.	109-B	1913	44	73
Hanley, Sask	23 D	1914	227	210
Hanover, Ont	298, 299	1913	60	81
Hartoka Jet., Que.	219-B	1913	52	77
Harriston, Ont	303, 304	1913	61	83
Hartland, N.B.	31-B	1910	148	461
Hatton, Sask	151-C	1915	21	35
Heath, Alta	34-H	1915	21	34
Henfryn, Ont	310	1913	61	83
Herbert, Sask	118-C	1914	230	241
Hillhurst, Que.	13	1910	155	165
Holland Centre, Ont	281	1913	59	82
Holmesville, Ont	322	1913	62	83
Holmfield, Man.	22-C	1913	67	87
Howick Jet., Que.	87	1910	456	466
Hubbards, N.S.	397 B	1915	9	28
Hull, Que.	459, 460	1914	217	234
Humes, Y.T.	132	1913*	31	31
Hyde Park Jet., Ont	344	1913	63	84
	I.			
Iberville, Que	74	1910	452	463
Iderton, Ont	339	1913	63	84
Indian River, Y.T.	205	1913*	33	33
Ingersoll, Ont	229, 230	1913	56	80
Inkerman, Ont	110	1910	457	466
Irvine, Alta	159-C, 160 C	1915	22	35
	J.			
James River, N.S.	169-B	1913	47	74
Jeannette, Ont.	249-A	1913	57	81
Jordan, Ont	205	1913	63	85
Junata, Sask	6-H	1915	19	34
	K.			
Kazabazua, Que	479	1914	218	234
Kearney, Ont	552	1915	14	31
Keewatin, Ont	34-F	1915	19	33
Kempton, Ont	113	1910	457	466

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED.—Continued

Place	B.M. Number	Year of Publication.	Description	Elevation	
				Page	Page
Kemptville, Ont	143-A	1913		52	78
Kenaston, Sask	21-D	1914		227	240
Kenora, Ont	36-F, 37-F, 38-F	1915		19	33
Kilburn, N.B.	37-B	1910		148	161
Killaloe, Ont	518, 519	1915		16	32
Killarney, Man.	25-C	1913		67	87
Kingston, Ont	139, 141, 141-A, 142	1910		459	167
Kipp, Alta	81-D	1915		25	38
Kippen, Ont	330	1913		62	84
Kirkcaldy, Alta	70-D	1915		26	38
Kirk Ferry, Que.	465, 466	1914		218	234
Kleinburg, Ont	258	1913		58	82
Knowlton, Que.	49	1910		454	164
Komoka, Ont	237-A	1913		56	80
L.					
Landis, Sask	16-H	1915		20	34
Lausdowne, Ont	130, 131	1910		458	466
Leekford, Sask	41-D	1914		228	240
Leney, Sask	8-H	1915		19	34
Lennoxville, Que.	6	1910		454	465
Lepreau, N.B.	89-B	1910		451	462
Lethbridge, Alta.	196-C, 197-C, 198-C				
	199-C, 200-C	1915		24	36
	83-D	1915		25	38
	221-B, 222-B	1913		52	77
Levis, Que.	307, 308	1913		61	83
Listowel, Ont	34	1913*		26	26
Little River, Y.T.	418-B, 419-B, 420-B	1915		11	29
Liverpool, N.S.	318	1913		61	85
Londesborough, Ont	235, 236	1913		56	80
London, Ont	239-A	1913		56	81
Longwood, Ont	476	1914		218	234
Low, Que.	455-B	1915		13	30
Lower Argyle, N.S.	452-B	1915		12	29
Lower East Pubnico, N.S.	337	1913		62	84
Lucan Crossing, Ont	7-D	1913		71	90
Lumsden, Sask.	125	1910		458	466
Lyn, Ont	217	1913		55	80
Lynden, Ont.	156-B	1913		47	74
Lyon Brook, N.S.					
M.					
Maccoun, Sask.	69-C	1913		69	89
Madawaska, Ont	530, 531	1915		15	32
Magog, Que.	40, 41, 41-A	1910		452	463

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Place	B. M. Number	Year of Publication	Description	Elevation
			Page	Page
Maitland, Ont.	121	1910	458	466
Malagash, N.S.	144-B	1913	46	74
Mallorytown, Ont.	128	1910	458	466
Manitou, Man.	11-C, 12-C	1913	66	87
Maple Creek, Sask.	145-C, 146-C	1914	231	241
Markdale, Ont.	276	1913	59	82
Marysville, Ont.	152	1910	459	467
Massawippi, Que.	28-A	1913	48	75
Mather, Man.	17-C	1913	67	87
McAdam Jct., N.B.	11-B	1910	447	460
McGivney Jct., N.B.	333-B	1914	215	233
Meadowville, N.S.	153-B	1913	46	74
Medicine Hat, Alta.	167-C, 168-C, 169-C	1915	22	35
Medora, Man.	40-C	1913	68	88
Medway, N.S.	415-B	1915	10	28
Megantic, Que.	21-A-2, 22-A	1913	50	76
Melancthon, Ont.	271-A, 272	1913	59	82
Melita, Man.	42-C, 43-C	1913	68	88
Merigomish, N.S.	164-B	1913	47	74
Merriton, Ont.	209	1913	63	85
Midale, Sask.	71-C	1913	69	89
Midhurst, Ont.	390	1913	65	86
Midnapore, Alta.	54-D	1915	27	39
Milan, Que.	18-A-2	1913	50	76
Milestone, Sask.	85-C	1913	70	89
Mill River, Alta.	213-C, 214-C	1915	25	37
Minto, Y.T.	106	1913*	30	30
Molson, Man.	10-F	1915	17	33
Monekland, Ont.	102	1910	457	466
Moneton, N.B.	132-B, 133-B, 134-B	1913	45	73
" "	373-B, 374-B	1914	217	233
Montague, Y.T.	69	1913*	28	28
Mooretown, Ont.	362	1914	221	236
Moosejaw, Sask.	94-C, 95-C, 96-C	1913	71	89
" "	103-C	1914	229	241
Morden, Man.	7-C, 8-C	1913	66	87
Morse, Sask.	116-C, 117-C	1914	229	241
Mortlach, Sask.	110-C	1914	229	241
Mountain, Ont.	111	1910	457	466
Mulgrave, N.S.	185-B	1913	48	75
Munier, N.B.	37-B	1910	448	461
Musquash, N.B.	91-B, 92-B	1910	451	462
Mystic, Que.	65	1910	453	464

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
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Place	B.M. Number	Year of Publication	Description	Elevation
			Page	Page
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Napadogan, N.B.	323-B, 324-B	1914	215	232
Napanee, Ont.	149, 150	1910	159	467
Napinka, Man.	41-C	1913	68	88
Nauwigewauk, N.B.	107-B	1913	14	73
Newbury, Ont.	242	1913	56	81
Newcastle, Ont.	176	1913	53	79
New Dayton, Alta.	206-C, 207-C	1915	24	36
New Glasgow, N.S.	160-B	1913	47	74
Ninga, Man.	29-C	1913	67	87
Nobleford, Alta.	79-D	1915	25	38
Nordenskiöld, Y. T.	47	1913*	27	27
Northfield, Ont.	494	1914	219	235
North Portal, Sask.	+	1913	88	88
Northwood, Ont.	245	1913	57	81
Norton, N.B.	113-B	1913	14	73
Norton Mills, Vermont	23, 24, 25	1910	155	465
Notre-Dame-du-Lac, Que.	64-B	1910	149	461
	O			
Oak Bay, N.B.	4-B	1910	446	460
Oakville, Ont.	193	1913	55	80
Oban, Sask.	14-H	1915	20	34
Okotoks, Alta.	60-D	1915	26	38
Orangeville, Ont.	267	1913	58	82
Osgoode, Ont.	117-A, 118-A	1913	52	78
Oshawa, Ont.	178-A, 179, 179-A	1913	54	79
Osler, Sask.	36-D	1914	228	240
Ottawa, Ont.	125-A	1913	53	78
" "	503, 504	1914	220	235
Owen Sound, Ont.	286, 287, 288	1913	60	82
Oxbow, Sask.	55-C	1913	69	88
Oxford, Ont.	144	1910	157	466
Oxford, N.S.	136-B	1913	16	74
Oxford Jet, N.S.	135-B	1913	45	74
	P			
Palgrave, Ont.	376	1913	64	86
Palmerston, Ont.	305	1913	61	83
Pars, Ont.	222	1913	55	80
Parkburg, Sask.	111-C	1914	229	241

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ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
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Parkhill, Ont	346	1914	221	236
Parry Sound, Ont	419, 420	1914	223	237
Pasqua, Sask	93-C	1913	71	80
Pelly, Y.T.	118, 119	1913*	30	30
Pense, Sask	99-C	1913	71	89
Perth, N.B.	39-B	1910	118	161
Petitecodiac, N.B.	123-B	1913	15	73
Piapot, Sask	141-C	1914	231	241
Pickering, Ont	180-A-2	1913	54	79
Piedmont, N.S.	165-B	1913	47	74
Pierson, Man	46-C	1913	68	88
Pike Creek, Ont	254	1913	57	81
Pilot Mound, Man	15-C	1913	67	87
Pinewood, Ont	20-E	1914	226	239
Pinto, Sask	67-C	1913	69	88
Plaster Rock, N.B.	301-B, 302-B	1914	213	232
Pomquet, N.S.	176-B	1913	48	74
Port Clyde, N.S.	112-B	1915	12	29
Port Hope, Ont	172, 172-A, 173	1913	56	79
Port Robinson, Ont	212	1913	63	85
Port Saxon, N.S.	141-B	1915	12	29
Port Union, Ont	182	1913	54	79
Prescott, Ont	119	1910	158	166
Prince Albert, Sask	47-D, 48-D, 49-D	1914	228	240
Princeton, Ont	224	1913	55	80
Pubnico, N.S.	154-B	1915	13	30
R.				
Rainy River, Ont	17-E	1911	226	239
Reford, Sask	18-II	1915	20	34
Regina, Sask	1-D, 2-D, 3-D	1913	71	90
Renfrew, Ont	505, 506, 507	1915	17	32
River Glade, N.B.	125-B	1913	45	73
Rivière-du-Loup, Que.	76-B, 77-B, 78-B	1910	150	161
Roche-Percée, Sask	65-C	1913	69	88
Rock Island, Que.	33-A	1913	49	75
Roosevelt, Minn	13-E	1914	226	239
Rose Point, Ont	565	1915	13	31
Rosthern, Sask	40-D	1914	228	240
Rothsay, N.B.	103-B, 104-B	1913	44	73
Rouleau, Sask	88-C, 89-C	1913	70	89
Rush Lake, Sask	120-C	1914	230	241
Russell, Ont	499	1914	220	235

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
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S				
Sable River, N.S.	127-B	1915	11	29
Sandstone, Alta.	58-D	1915	20	38
Sarnia, Ont.	357, 358, 359, 360	1914	221	236
Saskatoon, Sask.	20-D, 30-D, 31-D, 32-D, 33-D	1914	227, 228	240
Scotia Jet., Ont.	553	1915	14	31
Scotstown, Que.	16-A-2	1913	49	76
Scott, Sask.	19-B	1915	20	34
Shag Harbour, N.S.	449-B	1915	12	29
Shallow Lake, Ont.	200	1913	60	83
Shannonville, Ont.	154	1910	459	467
Shelburne, N.S.	433-B, 434-B, 435-B, 436-B	1915	11, 12	29
Shelburne, Ont.	271	1913	59	82
Sherbrooke, Que.	1, 2, 3	1910	454	465
"	35, 36	1910	453	463
"	51-B	1910	449	461
Sigas, N.B.	45	1910	452	463
South Stukely, Que.	10-E	1914	225	239
Sprague, Man.	19-A-2, 20-A	1913	50	76
Springhill, Que.	556	1915	14	31
Sprucedale, Ont.	67	1910	453	464
Stanbridge, Que.	34	1913	49	75
Stanstead, Que.	1-C	1913	66	87
Stephen, Minnesota	148	1913*	31	31
Stevens, Y.T.	162, 163	1913*	32	32
Stewart Crossing, Y.T.	32-B	1910	448	461
Stickney, N.B.	203-C, 204-C	1915	24	36
Stirling, Alta.	201	1913	63	85
Stoney Creek, Ont.	250	1913	57	81
Stoney Point, Ont.	79	1910	456	463
Stottsville, Que.	454, 454-A	1914	225	238
Sudbury, Ont.	117-B	1913	44	73
Sussex, N.B.	52	1910	454	464
Sutton, Que.	126-C, 127-C	1914	230	241
Swift Current, Sask.				
ST				
St. Anselme, Que.	214-B	1913	52	77
St. Armand, Que.	68, 69, 70	1910	453	464
St. Catharines, Ont.	207, 208	1913	63	85
St. Evariste, Que.	195-B, 196-B	1913	51	77
St. George, N.B.	83-B	1910	451	462

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
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Place	B.M. Number	Year of Publication	Description	Elevation
			Page	Page
Ste. Henedine, Que.	212 B	1913	52	77
St. Henri, Que. (Lévis County)	216 B	1913	52	77
St. Honoré, Que.	70 B	1910	450	401
St. John, N.B.	97 B, 98 B, 99 B		0	28
	100 B	1910	452	402
St. Johns, Que.	75	1910	452	403
" "	76	1910	455	403
St. Joseph-de-Lévis, Que.	220 B	1913	52	77
St. Louis, Que. (Beauharnois County)	88	1910	456	466
St. Margaret, N.S.	394 B	1915	9	28
St. Mary, Que.	209 B	1913	51	77
St. Polycarpe Jet., Que.	92	1910	456	466
Ste. Rose, Que. (Témiscouata County)	62 B	1910	449	461
St. Stephen, N.B.	2 B, 3 B	1910	446	460
T				
Taber, Alta.	186 C, 187-C	1915	23	36
Takhini, Y.T.	20, 21	1913*	25	25
Tako, Sask.	20 H	1915	20	34
Tara, Ont.	293	1913	60	83
Tatamagouche, N.S.	147-B	1913	46	74
Thamesville, Ont.	243 A	1913	57	81
Thedford, Ont.	349	1914	221	236
Thornhill, Man.	9-C	1913	65	87
Thorold, Ont.	210, 211	1913	63	85
Tompkins, Sask.	138-C	1914	231	241
Toronto, Ont.	185, 186, 187,			
	188, 188-A, 189	1913	54	79
Tottenham, Ont.	377 A	1913	64	86
Trenton, Ont.	161	1910	460	467
Tring Jet., Que.	204 B	1913	51	77
Tupperville, Ont.	369	1914	222	236
Tusket, N.S.	460 B	1915	13	30
U				
Unity, Sask.	22 H	1915	20	34
Upper Woods Harbour, N.S.	451 B	1915	12	20
Utopia, Ont....	387	1913	65	86

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Valley Jet., Que.	207 B	1913		51	77
Vern, Sask.	23 H	1915		20	31
Versailles, Que.	72	1910		452	463
Vulcan, Alta.	68 D, 69 D	1915		26	38
W					
Wainwright, Alta.	36 H	1915		21	34
Wakefield, Que.	109, 470	1914		218	254
Walkerton, Ont.	367	1914		222	266
Walsh, Alta.	155 C	1915		22	35
Warman, Sask.	35 D	1914		228	240
Warner, Alta.	200 C, 210 C	1915		24	36, 37
Warroad, Minn.	12 E	1914		226	239
Waterville, Que.	9	1910		455	465
Webb, Sask.	132 C	1914		230	244
Welland, Ont.	213	1913		64	85
Welland Jet., Ont.	214	1913		64	85
West Merigonash, N.S.	163 B	1913		47	74
Weston, Ont.	256 A	1913		58	82
Weyburn, Sask.	80 C, 81 C	1913		70	80
Whitby, Ont.	180 A	1913		54	79
Whitby, Ont.	1	1913*		25	25
Whitby, Y.T.	14 I	1915		18	33
Whitmore, Alta.	42 P, 43 R	1915*		23	23
White Pass, Y.T.	35 C	1913		68	88
Whitewater, Man.	536	1915		15	31
Whitney, Ont.	86 C, 87 C	1913		70	89
Wilcox, Sask.	109	1910		457	466
Winchester, Ont.	255	1913		57	81
Windsor, Ont.	314	1913		61	83
Wingham, Ont.	176 C	1915		23	35
Winnifred, Alta.	1-F, 2-F, 3-I	1915		17	33
Winnipeg, Man.	202	1913		63	85
Winona, Ont.	25 H	1915		20	34
Winter, Sask.	226, 227	1913		55	80
Woodstock, Ont.	25 B, 26 B, 27 B	1910		447	460
Woodstock, N.B.	179	1913*		33	33
Wounded Knee, Y.T.					

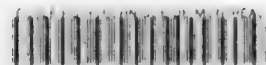
ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT OR NEAR WHICH BENCH-MARKS
HAVE BEEN ESTABLISHED

City	B. M. Name	Year of Establishment	Description		Elevation
			Place	Feature	
Y					
Yamoussoukro	16612-16613-1	1915	11	1	1
Yamoussoukro	8000	1915	70	80	80
Yamoussoukro	94	1915	20	20	20
Z					
Zumbwa	27-11	1915	20	1	1

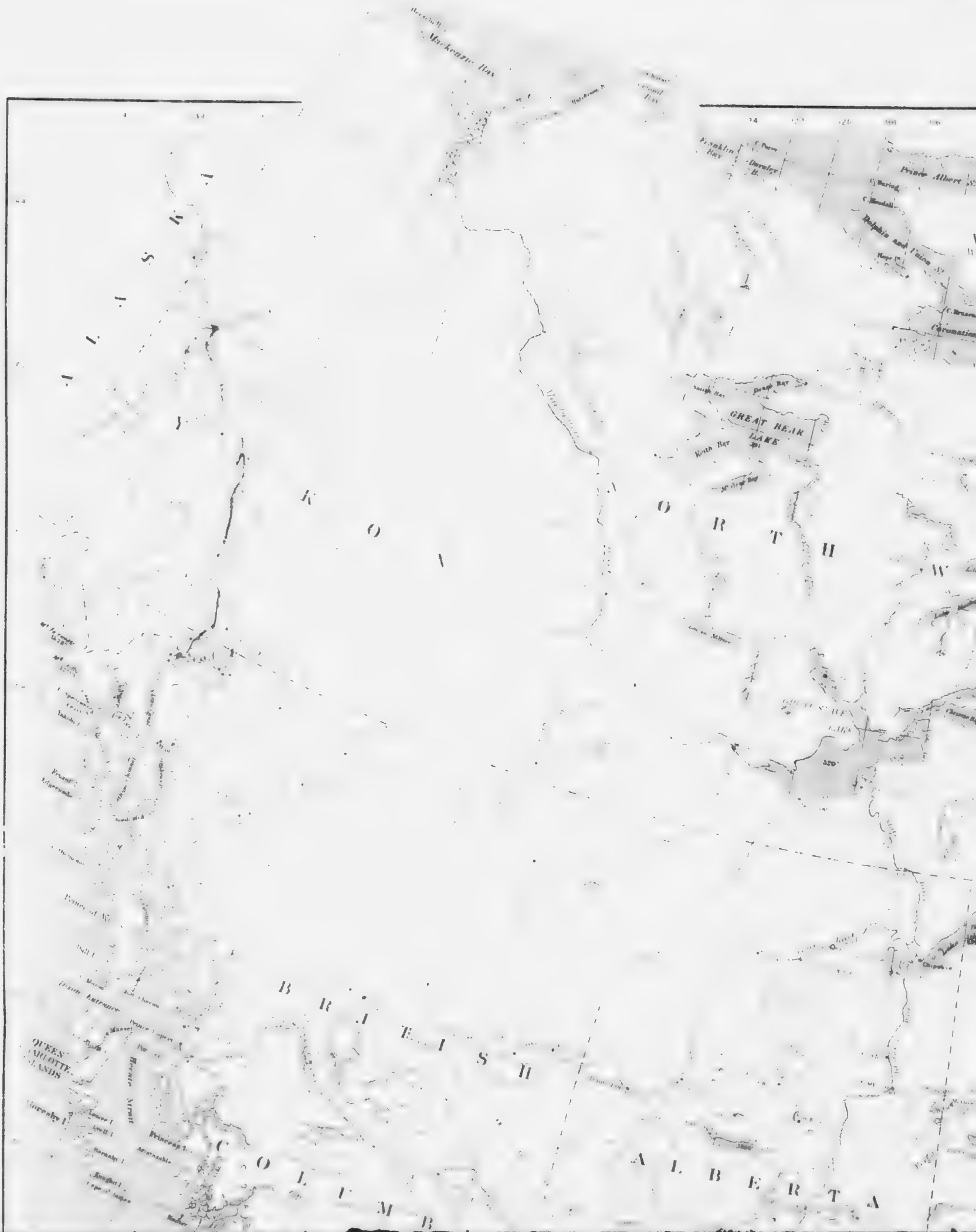
Dominion Observatory.

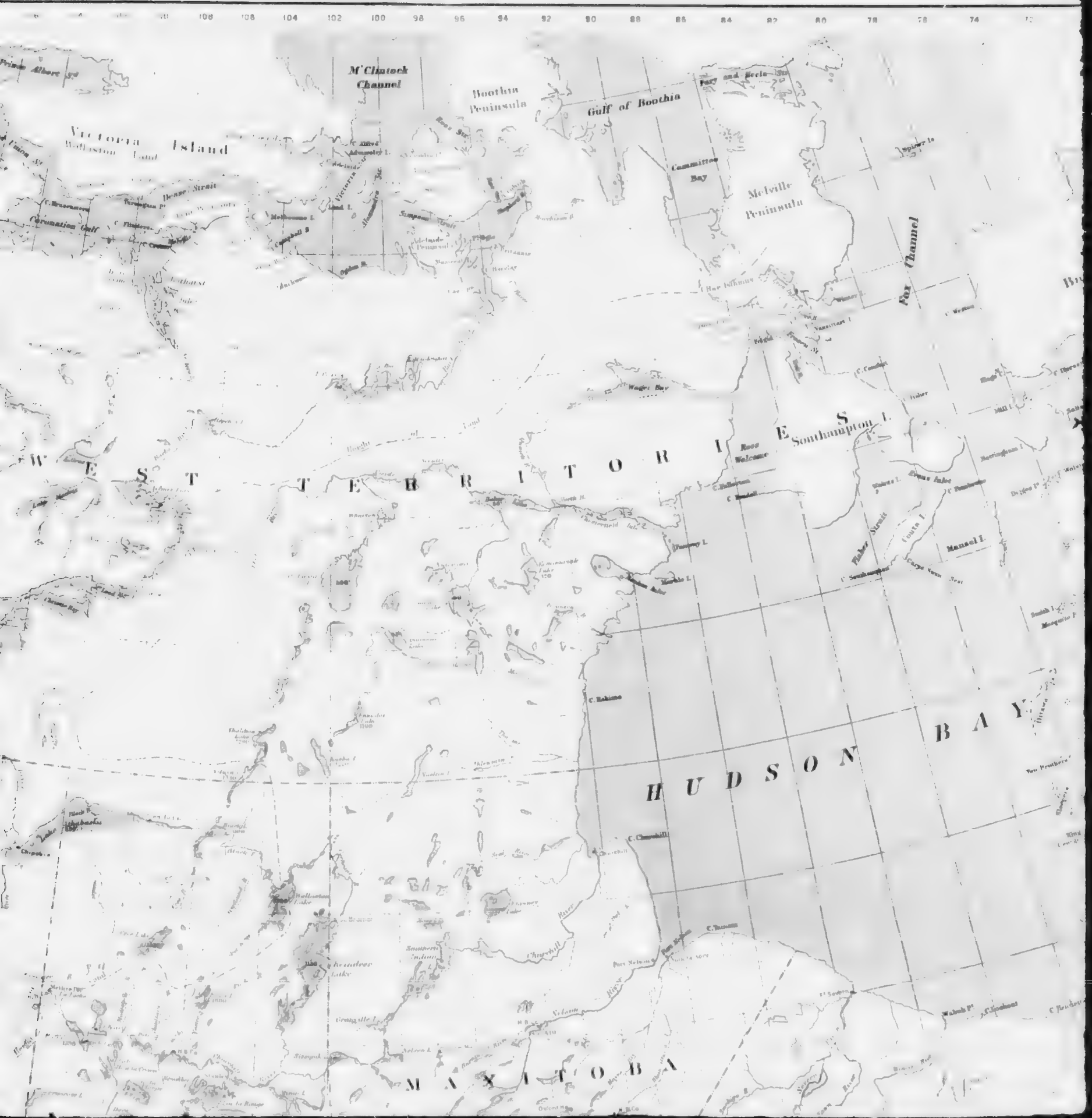
OTTAWA.

February, 1915

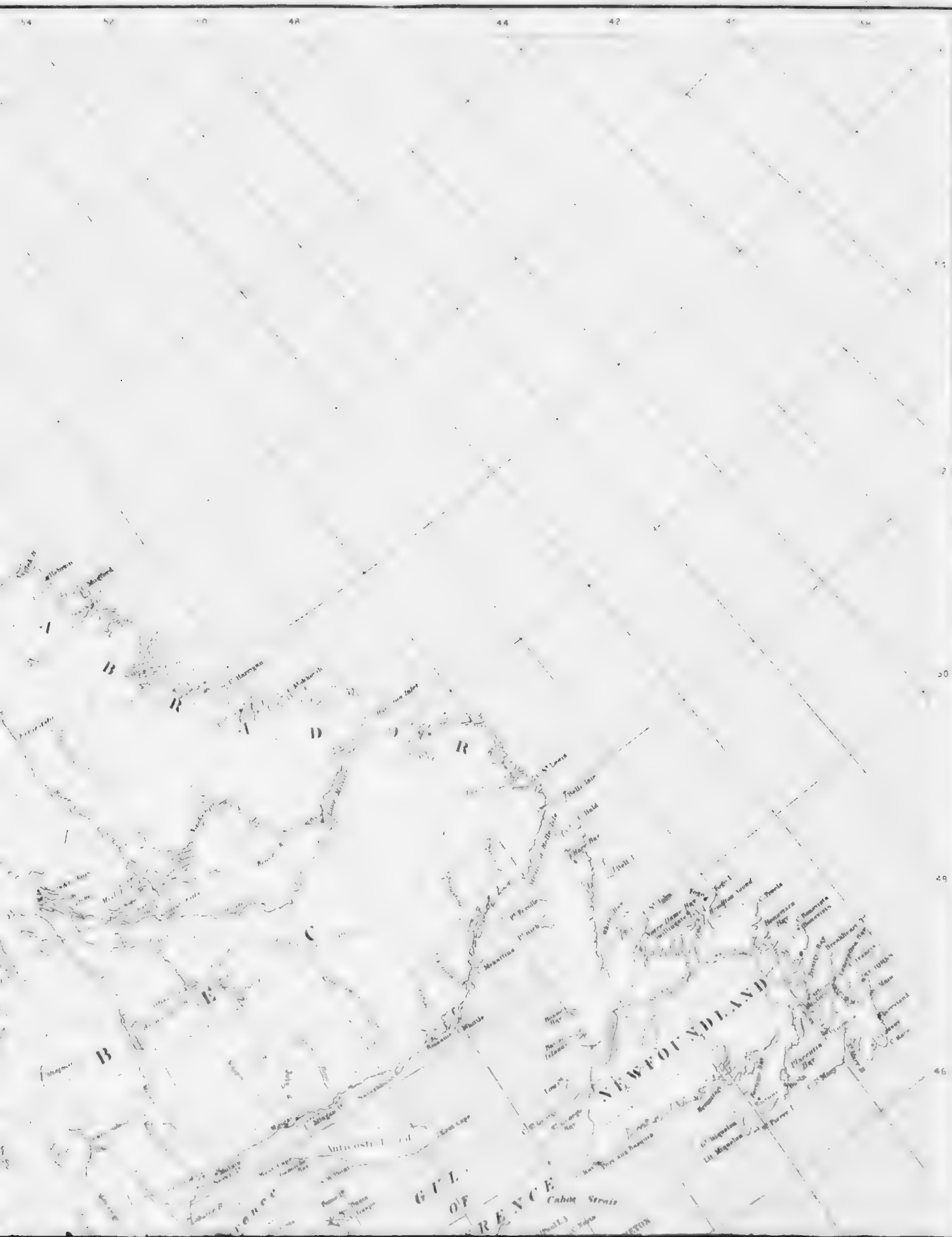


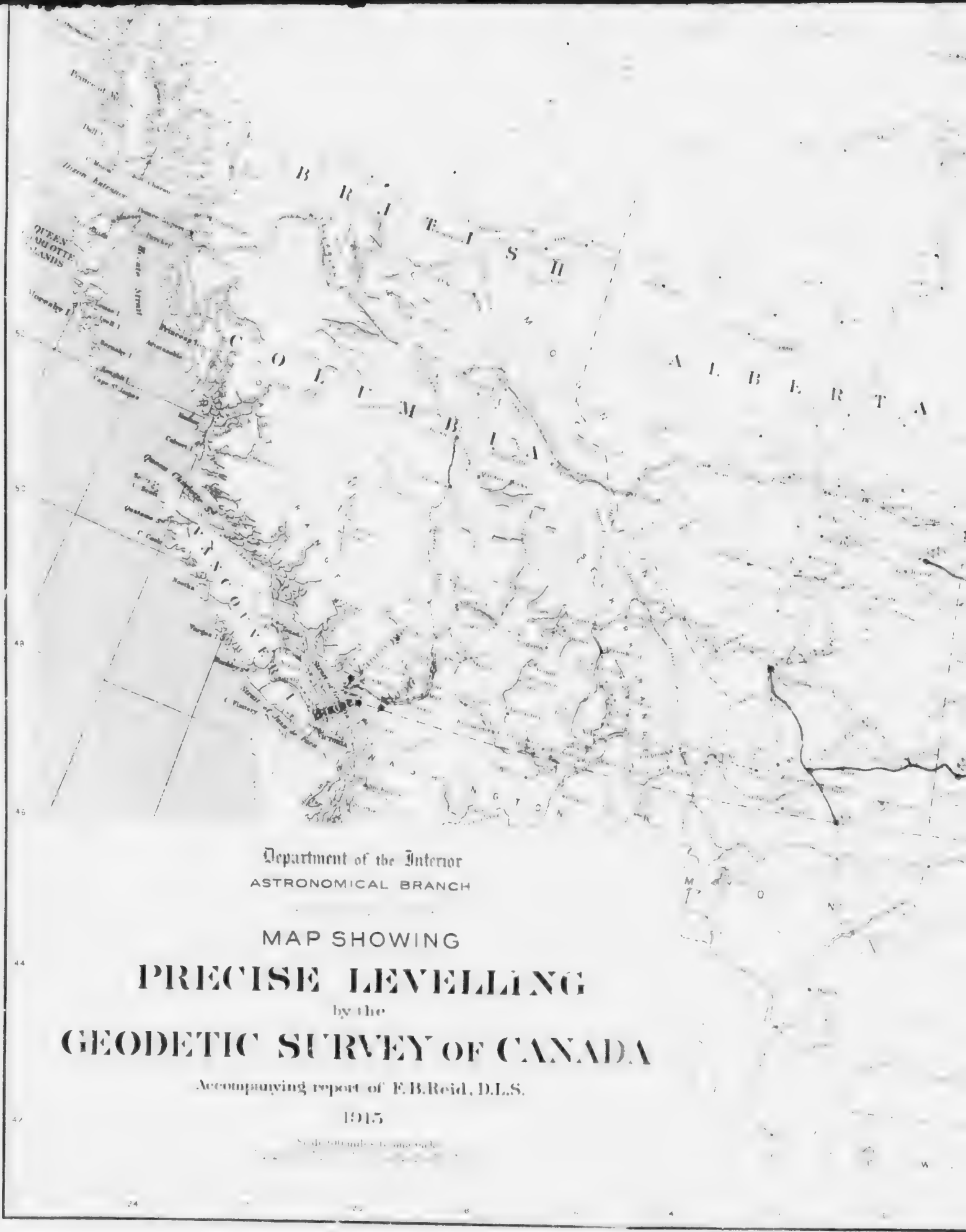
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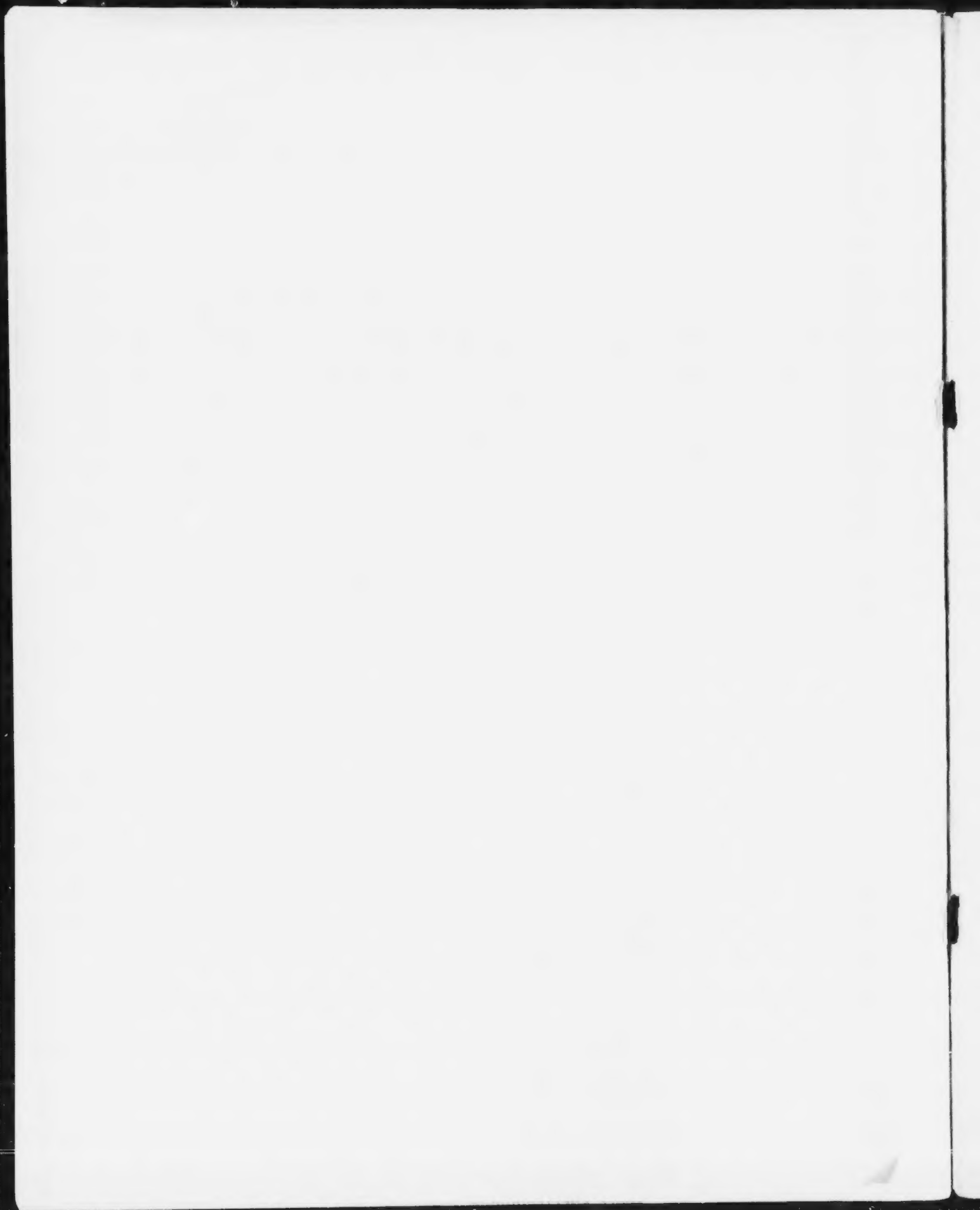






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